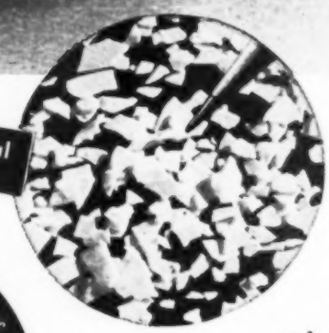
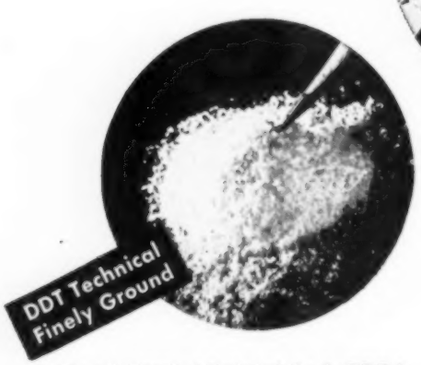
AGRICULTURAL CHEMICALS

DDT

Technical Grades and
Dry Wettable Concentrates
Dust Base Concentrates
Emulsifiable Concentrates
Solvent Concentrates





General Chemical Technical Grade DDT is available in either the *finely ground* or the small, *thin flake* types that insure easy handling and processing in your milled or oil-base products. The flake type offers processing efficiencies and economies that are well worth investigating. Samples available.

BASIC CHEMICALS

GC

FOR AMERICAN INDUSTRY

General Chemical's DDT materials are developments of research, production and quality control facilities that are among the nation's foremost. This combination—together with nearly half a century of experience and leadership "in insecticides"—is your assurance that you will always obtain DDT materials of uniformly high quality on every purchase from General Chemical. For your needs . . . write or phone nearest General Chemical Office below.

GENERAL CHEMICAL DDT PRODUCTS:

- DDT TECHNICAL, Finely Ground
- DDT TECHNICAL, Thin Flake
- GENITOX* S-50 (50% DDT Wettable, Microfine)
- GENITOX D-50 (50% Dust Base, Microfine)
- GENITOL* EM-25 (25% Emulsifiable)
- GENITOL EM-30 (30% Emulsifiable)
- GENITOL SC-30 (30% Solvent Concentrate)
- GENITOL SC-40 (40% Solvent Concentrate)

*Reg. U. S. Pat. Off.

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Makers of the Nation's Foremost ORCHARD BRAND SPRAYS + DUSTS *Insecticides and Fungicides*

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo • Charlotte Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis New York • Philadelphia • Pittsburgh • Portland (Ore.) • Providence • San Francisco • Seattle St. Louis • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

Baird's Concentrated WEED KILLERS
for Positive WEED CONTROL

•

No. 50 WEED KILLER—Asenical Type

This compound provides an easy, scientific method of destroying unwanted vegetation. For use around parking lots, tennis courts, railroad rights of way, airfields, flagstone walks, driveways and garden paths. Soluble in water. Inexpensive to use.

WEED KILLER — Formula 2-4-D Liquid Form

Selective water-soluble compound offered in three grades: 10%, 20% and 40%. For extensive use on golf courses, parks, playgrounds, fire lanes, ditches, orchards, vineyards and around farm buildings. Kills such weeds as dandelion, poison ivy, poison oak, rag weed, plantain (broad and narrow leaf), thistles, docks and many others.

...It's Wonderful!

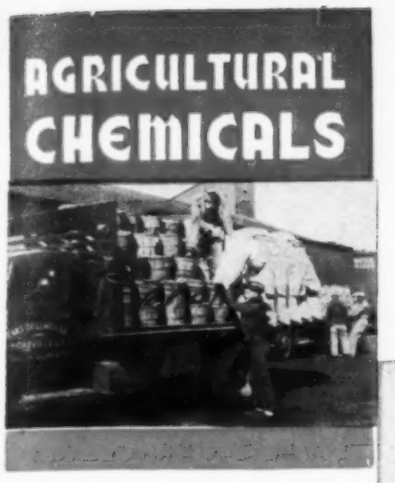
SPRING brings back the grass, flowers and leaves — but it also brings back man's perennial enemy — WEEDS!

There are great sales opportunities in the field of herbicides. We can help you meet the demand with effective weed-killing formulations which can be sold with your own label or under the BAIRD & MCGUIRE CERTIFIED SEAL.

Free labels with your imprint with orders of specified amounts.

Serving the Industry **Baird's** ***for Over 38 Years***

Baird & McGuire, Inc.
HOLBROOK, MASSACHUSETTS



THIS MONTH'S COVER

Fertilizer for 1948 is now moving from factory to farm. U.S.D.A. statistics say that in 1948 there will be 4 percent more nitrogen, 5 percent more potash and 6 percent more phosphate than last year. During 1947, some 16,000,000 tons of fertilizer were produced in the U. S., and the 1948 output is expected to surpass this figure. This photo taken at plant of Morris Karp & Son, Farmingdale, Long Island, N. Y.

MARCH 1948
VOL. III No. 3

A Monthly Magazine For the Trade

•

In This Issue:

AGRICULTURAL CHEMICALS

Subscription Rates: *One year* $3.00, *two years* $5.00. *Outside U. S. one year,* $4.00. *Published monthly on the 15th by Industry Publications, Inc. Office of Publication, 123 Market Place, Baltimore 2, Md. Advertising and editorial office, 254 W. 31st St., New York, 1, N. Y. Advertising rates made known on application. Closing date for copy—25th of the month previous to date of issue.*

Entered as Second Class Matter at the Post Office at Baltimore, Md., under the Act of March 3rd, 1879.

FOR YOUR INFOR M ATIO

Garden fleahopper,
Halticus citri.
Approximately 28 times natural size.

SANTOBANE
(Monsanto DDT)

SANTOBANE SPECIFICATIONS

Physical form	Fine granular powder
Color	White to cream
Setting point	89° C. minimum
Organically bound	
Chlorine (% by weight)	48% minimum to 51% maximum
pH of water extract	6.0 minimum to 8.0 maximum

When properly formulated, Santobane will kill insects in the four major groups — household, pre agricultural and animal. It is lethal either as a sto or contact poison and can be used in dusts, wet powders, solutions, emulsifiable solutions and aer

Carefully controlled manufacturing processes Santobane its uniform, free-flowing, granular ch teristics — permitting it to be readily solubilized, sified or milled.

Manufacturers and processors are invited to as further information and technical data on Santob Write to MONSANTO CHEMICAL COMPANY, Or Chemicals Division, 1700 South Second Street, St. 4, Missouri. Return the coupon if more convenient.

Santobane: Reg. U.S.

NIFO

farm and

economic

Low-cost contr greenhouse p Nifos-T (Mon Technical). Ex spray solutio Nifos-T are d a host of oth

Containing 4 Nifos-T posse biological act phosphate. It most other co formulations, residual toxic

For latest ap Nifos-T, write PANY, Organ Second Stree return the cou

...ws of Monsanto Chemicals for Insecticides, ...rbicides and Fungicides....March, 1948

NIFOS-T Controls orchard, farm and greenhouse pests economically

Low-cost control of destructive orchard, farm and greenhouse pests is commercially practical with Nifos-T (Monsanto Tetraethyl Pyrophosphate, Technical). Extensive tests have shown that dilute spray solutions, aerosols and dusts containing Nifos-T are deadly to aphids, mites, thrips and a host of other insect pests.

Containing 40% tetraethyl pyrophosphate, Nifos-T possesses approximately 3 times the biological activity of commercial hexaethyl tetraphosphate. It is a contact-killer, compatible with most other compounds used in insect-destroying formulations, and does not cause problems in residual toxicity.

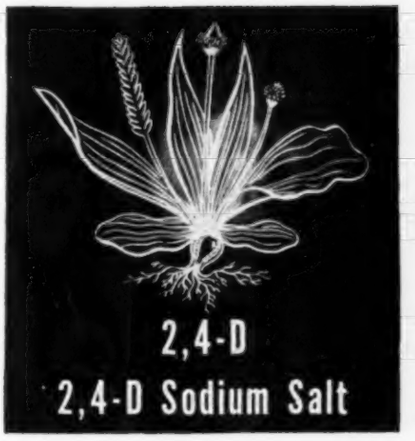
For latest application and technical data on Nifos-T, write to MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri, or simply return the coupon.

NIFOS-T FOR ORCHARDS

NIFOS-T FOR FARMS

NIFOS-T FOR GREENHOUSES

Some Farm, Fruit and Greenhouse Pests Susceptible to Nifos-T — Monsanto's Tetraethyl Pyrophosphate
Two-spotted spider mite
Pacific mite
Citrus red mite
Cyclamen mite
Greenhouse thrips
Codling moth (larvae)
Leaf rollers
Melonworm (adults and larvae)
California oakworm
Southern armyworm
Pomace fly
House fly
Leafhoppers (nymphs)
Pear psylla
Cotton or melon aphid
Spirea aphid
Cabbage aphid
Black pecan aphid
Pea aphid
Rose aphid
Chrysanthemum aphid
Green peach aphid
Walnut aphid
Mealybug
Scale insects (crawlers)
Soft scale
Citricola scale
Black scale



Monsanto 2,4-D and 2,4-D Sodium Salt, when properly formulated, provide effective and economical control of many annual weeds, deeply rooted perennials, woody shrubs and trees that cause large annual losses in crops.

A selective killer, 2,4-D is furnished by Monsanto as either insoluble 2,4-D Acid, or water-soluble 2,4-D Sodium Salt. Although present supplies are limited, formulators and processors are invited to contact Monsanto regarding their requirements.

MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Akron, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY ... WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY — ACS-3
Organic Chemicals Division
1700 South Second Street, St. Louis 4, Missouri
Please send me further information and technical data on:
Santobane ( ); Nifos-T ( ); 2,4-D ( )

Name _____ Title _____
Company _____
Type of Business _____
Address _____
City _____ State _____

ACTION NOW

can forestall shortages of vital insecticides later!

Present inventories of DDT, Benzene Hexachloride and other chlorinated agricultural chemicals can melt away as quickly as Winter's snows. Westvaco, an integrated producer of these important insecticides, therefore urges mixers and distributors to indicate their minimum requirements for the growing season now.

Delay may well result in the diversion of chlorine to other chemicals still in short supply. Delay may put your late-spring orders on a "60-90 day delivery" basis . . . jeopardize harvests in a crucial year.

For prices, present delivery schedules and technical data on the following chemicals address our Agricultural Chemicals Division:

DEVEX 'T'* (Technical DDT)
DEVEX D-50* (50% dry dust concentrate)
DEVEX W-50* (50% wettable dust concentrate)
SOILFUME* 80-20 and SOILFUME* 60-40 (Ethylene Dibromide)
FOSVEX* (Tetraethyl Pyrophosphate)
TRIVEX 'T'* (Technical Benzene Hexachloride)
TRIVEX D-50* (6% Gamma dry dust concentrate)
TRIVEX W-50* (6% Gamma wettable dust concentrate)
Complete line of Grain Fumigants

*Trade Mark

WESTVACO CHLORINE PRODUCTS CORPORATION

405 LEXINGTON AVENUE • NEW YORK 17, N.Y. • MU 9-4920

Butyl Ester of 2,4-D

Baker's 2,4-D FORMULATION No. 11

If your customers have grain fields infested with weeds —they can increase their yields many bushels an acre by treating with the "right" 2,4-D weed-killer.

According to reports at the latest North Central States Weed Control Conference, the Butyl Ester is "right" for use on wheat, rye, barley and oats. Baker's 2,4-D Formulation #11 is a liquid concentrate of the Butyl Ester of 2,4-D that readily forms a creamy stable emulsion with water.

Proper treatment with 2,4-D, of fields moderately infested with wild mustard, has increased wheat yields 10 to 15 bushels an acre, the USDA says.

Greatest weed damage in small grains occurs in the states from Maine to North Dakota, and south to Maryland and Iowa—and on the Pacific Coast. In wet years, the western semiarid states suffer extensive weed damage, also.

At today's high grain prices—there is an excellent opportunity for you to create sales with Baker's 2,4-D Formulation #11—Butyl Ester of 2, 4-D.

Formulation #11 is one of several 2,4-D formulations manufactured by Baker — each of which is especially designed to fit your customer's particular job. There are formulations for large or small scale applications . . . for pastures or growing crops . . . for "hard-to-kill" weeds and woody growths . . . for application by conventional sprayers, or special equipment like airplanes or fog applicators.

Baker's rich background of skill, experience and research can be valuable to you and your customers in solving weed problems. Investigate Baker's 2,4-D weed-killers today—available under Baker label or your own!

Write for FREE BULLETINS!

Get full facts about when, where and why to use each Baker's 2,4-D weed-killer. Write for free bulletins today! We will also send other valuable reference material on 2,4-D for your files. Address *Agricultural Chemical Division*, J. T. Baker Chemical Co., 66 South Main St., Phillipsburg, N. J.

Baker's Agricultural Chemicals

VITAL TOOL FOR *Management!*

Use it to *SPREAD* the national debt!

WITH MANAGEMENT BACKING, PAYROLL SAVINGS PLAN CAN HELP BUSINESS AND NATION

In 19,000 companies, the Payroll Savings Plan (for the regular purchase of U. S. Savings Bonds) has made employees more contented in their jobs—has cut down absenteeism—has even reduced accidents!

In addition, of course, the Plan builds financial security for each participant. Each Bond pays $4 at maturity for every $3 invested.

But the Plan has other, far-reaching benefits—to business and to the nation—which are equally important to you.

SPREADING THE NATIONAL DEBT HELPS SECURE YOUR FUTURE

The future of your business is closely dependent upon the future economy of your country. To a major extent, that future depends upon management of the public debt. Distribution of the debt as widely as possible among the people of the nation will result in the greatest good for all. How that works is clearly and briefly described in the brochure shown at the right. Request your copy—*today*—from your State Director of the Treasury Department's Savings Bonds Division.

WHY EXECUTIVE BACKING IS VITAL

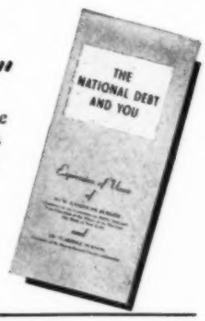
Employees still want the benefits of the Payroll Savings Plan. In fact, they *need* the P. S. P., because banks don't sell Bonds on the "installment plan"—which is the way most workers prefer to buy them. But wartime emotional appeals are gone. Human nature being what it is, the success of the Plan in your company is liable to dwindle unless a responsible executive keeps it *advertised*. The *reasons* for promoting it are as important as ever—to you, your company, and your country.

So—today—*check up* on the status of the Payroll Savings Plan in your company. *Act* on your responsibility to see that it is vigorously maintained.

The State Director will gladly help.

"The National Debt and You,"

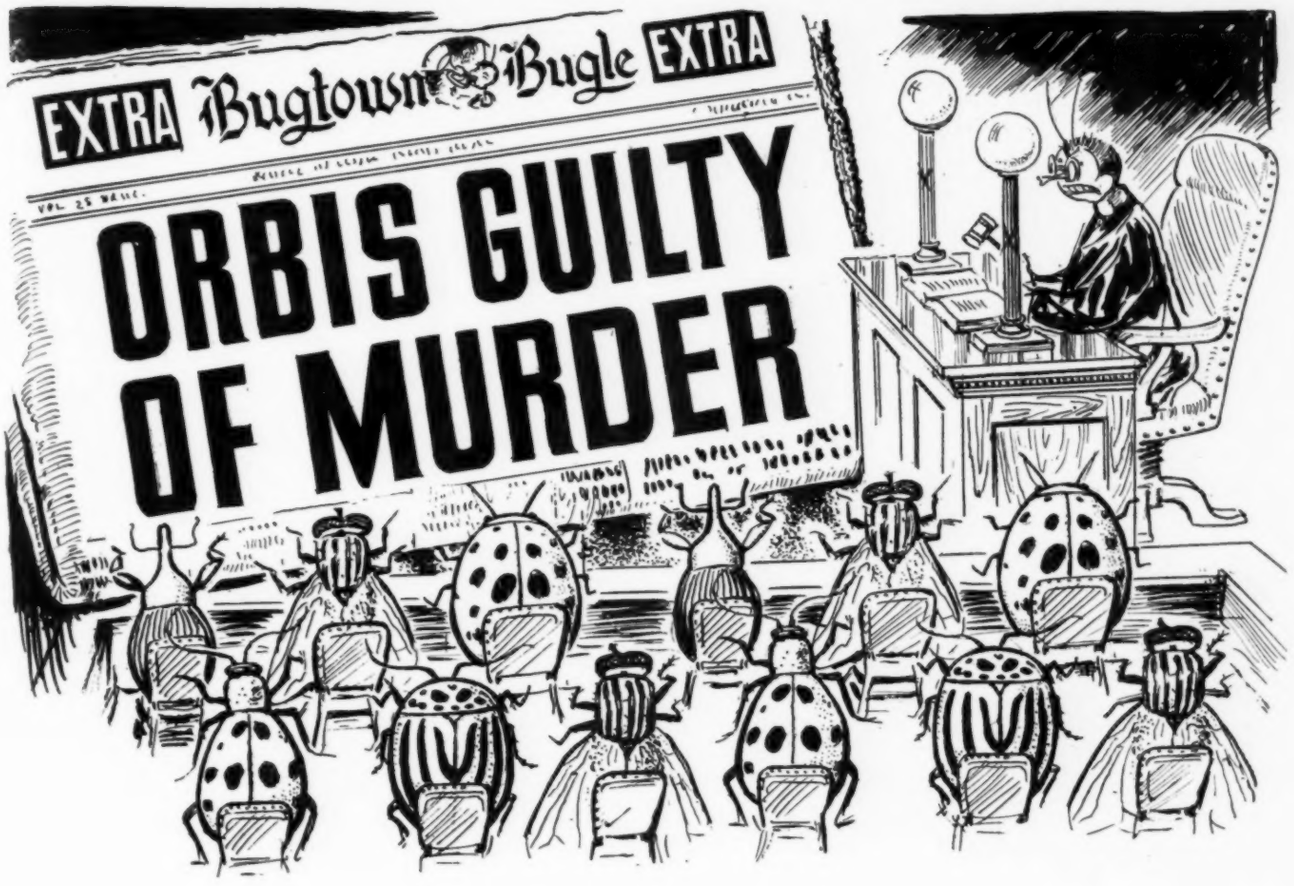
a 12-page pocket-size brochure, expresses the views of W. Randolph Burgess, Vice Chairman of the Board of the National City Bank of New York, and Clarence Francis, Chairman of the Board, General Foods Corporation. Request your copy from the Treasury Department's State Director, Savings Bonds Division.



The Treasury Department acknowledges with appreciation the publication of this message by

AGRICULTURAL CHEMICALS

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council



ALL-INSECT JURY UNANIMOUS IN VERDICT: ORBISCIDES FOUND TO BE MURDER WEAPON

In the famous jury trial of The Insects of the World vs. Orbis, the case went against Orbis from the beginning. Not a bug who testified had a kind word for Orbiscide Brand Raw Materials. "It's just plain murder," said the Potato Beetle from Colorado, "we were wiped out." "It was like mass insecticide," said the Bean Beetle from Mexico. "Right," said the Boll Weevil from Alabama, "it sho was."

But it was one decision Orbis was glad to lose. We hate insect pests here at Orbis and we've got a complete line of Orbiscide Insecticide raw materials to prove it. Investigate these Orbis products today.

Rotenone Orbiscide Concentrates

Cubé Resins—with definite rotenone content.
Cubé Powder—4-5% Rotenone
5% Rotenone Oil Concentrate

DDT Orbiscide Concentrates

25% DDT Emulsifiable Concentrate
30% DDT Oil Concentrate
DDT plus Rotenone Emulsifiable Concentrate
50% DDT Wettable Powder Concentrate
50% DDT Superfine Powder Concentrate

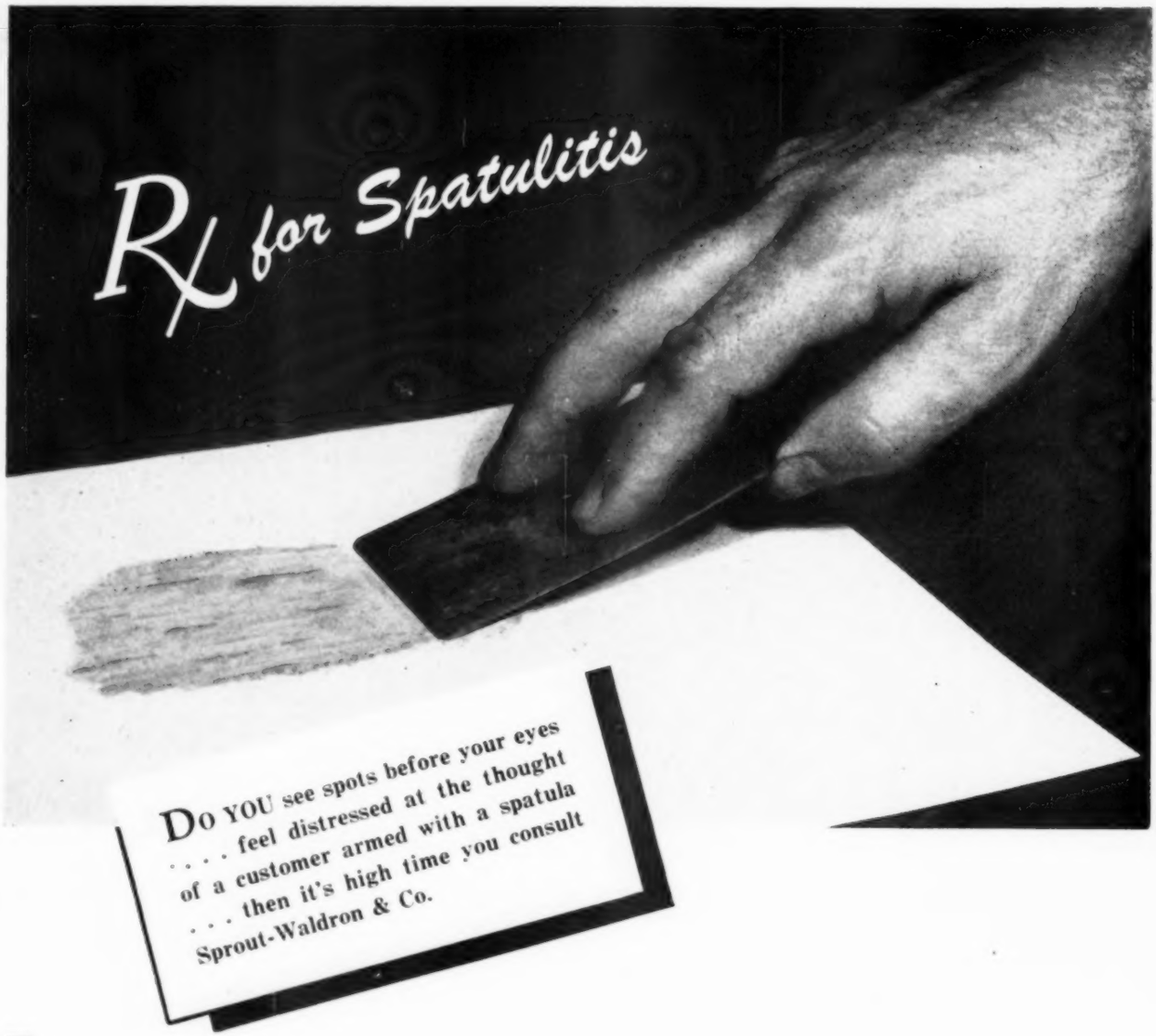
Write, wire or phone for complete information and samples. Let us solve your insecticide problems. No obligation.

INSECTICIDE SALES DIVISION

ORBIS
PRODUCTS CORPORATION
215 PEARL STREET, NEW YORK
FACTORY AND LABORATORY: NEWARK, N. J.

CUBÉ POWDER · CUBÉ RESIN · ROTENONE CRYSTALS
DERRIS POWDER · DERRIS RESIN · ROTENONE TECHNICAL
ROTENONE CONCENTRATES

CHICAGO · PHILADELPHIA · MEXICO, D.F. · BOSTON · LOS ANGELES · MEMPHIS, TENN.



A CAREFUL diagnosis would probably reveal a lack of uniformity in your insecticide product — caused by inefficient or outmoded equipment . . . unsuited to the specialized job of producing a lump-free blend of high uniformity.

In over 30 states, satisfied users of Sprout-Waldron Intimate Blending Systems keep their customers happy. They have found the cure for SPATULITIS through low-cost, quality production.

As so successfully demonstrated in widely diversified installations, a Sprout-Waldron System is adaptable to the most rigid requirements of every dust producer.

When you buy Sprout-Waldron, you get a complete system engineered and specified in every detail by experienced men for greater production and a top quality product. The extras are: high efficiency . . . low operating costs . . . a safe, dust-free plant.

We believe that you realize the importance of planning for your 1949 equipment now. Accordingly, we are prepared to make specific recommendations to meet your individual installation requirements anytime at your convenience. Consult Sprout - Waldron and Company, Muncy, Pennsylvania.

SPROUT WALDRON
Manufacturing Engineers

Garden Owners buy Dusts that are SAFE

And here are the ingredients that will help you provide that safety:

- **Cyclonene Dust Base**
  (5% piperonyl cyclonene)
- **Pyrotox* No. 100**
  (1% pyrethrins)
- **Pyrenone Dust Base No. 100**
  (2.5% piperonyl cyclonene, .25% pyrethrins)
- **Rotenone Powder**

and here's why —

Because the safest — *and most effective* — garden dusts are made with piperonyl cyclonene in combination with rotenone, or pyrethrum, or both . . . in proportions that you can vary widely. U.S.I.'s dust ingredients based on these materials are now available in quantity. Write or phone today for further information.

*Reg. Trade Mark

U.S.I. INDUSTRIAL CHEMICALS, INC.

60 East 42nd Street, New York 17, N. Y.

Branches in all principal cities

IN CANADA: Standard Chemical Co., Ltd., 195 Fleet Street East, Toronto 2, Canada

LOOK TO THOMPSON-HAYWARD....

. . for your every need in agricultural chemicals. Expanded and modernized laboratory and manufacturing facilities, plus many years' experience and close association with chemical users . . . enable the highly skilled Thompson-Hayward technicians to formulate and produce a wide variety of efficient and economical chemical products.

To assure quick, convenient delivery of these chemicals to you, Thompson-Hayward maintains 18 warehouses, strategically located throughout the Midwest and completely stocked with every type of chemical product.

Whether you handle agricultural chemicals as a distributor, as a processor or as a service organization . . . look first to Thompson-Hayward for swift, sure supplies of high quality chemicals.

Serving Agriculture With All Types of

WEED CONTROL CHEMICALS
INSECTICIDES
SOIL TREATING CHEMICALS
FERTILIZERS
FUNGICIDES
STOCK DIPS AND SPRAYS
FUMIGANTS
DAIRY FARM CHEMICALS
RODENTICIDES
DISINFECTANTS AND DEODORANTS

KANSAS CITY
(MAIN OFFICE)
MINNEAPOLIS
OKLAHOMA CITY
N. LITTLE ROCK
SAN ANTONIO
CORPUS CHRISTI
DES MOINES
DAVENPORT
NEW ORLEANS
ST. LOUIS
HOUSTON
DALLAS
WICHITA
MEMPHIS
CHICAGO
OMAHA
DENVER
TULSA

Manufacturers of

*DED-WEED
2,4-D Weed Killer
DED-TOX
DDT Insecticides
*TRI-6
BHC Insecticides
PHENACIDE
Toxaphene Insecticides
TOXICHLOR
Chlordane Insecticides
*RAT-TROL
Antu Rodenticides
SEPTIGARD
Quaternary Ammonium Disinfectants
SWAN BRAND
Grain Fumigants
Disinfectants and Stock Dips

AGRICULTURAL THOMPSON-HAYWARD DIVISION

*REG. U. S. PATENT OFFICE

SAVE MONEY... WIN CUSTOMERS

Here are some of the advantages you'll get by using St. Regis Packers and multiwall paper valve bags, for fertilizers.

HIGHER TON OUTPUT. The speedy St. Regis 160-FB Packer fills and weighs 12 to 16 multiwall paper valve bags every minute, on a straight run of a single grade.

ONE MAN HANDLING. This economical packaging system cuts labor costs, the operation is easily handled by one man.

CLEAN, COMPACT. These heavy-duty multiwall bags are built to specification for your product. You get a neat, compact, dust-proof package that customers like.

PROTECTION. Multiwalls give remarkable protection to their contents. Their tough layers of paper even withstand a sudden shower! And when a St. Regis Multiwall is opened, the fertilizer flows freely.

There is a St. Regis multiwall bag sales office near you, glad to discuss your needs.

SALES SUBSIDIARY OF ST. REGIS PAPER COMPANY

ST. REGIS SALES CORPORATION
230 PARK AVENUE • NEW YORK 17, N. Y.

Offices in New York • Chicago • Baltimore • San Francisco and 20 other industrial centers—IN CANADA: ST. REGIS PAPER CO. (CAN.) LTD., MONTREAL • HAMILTON • VANCOUVER

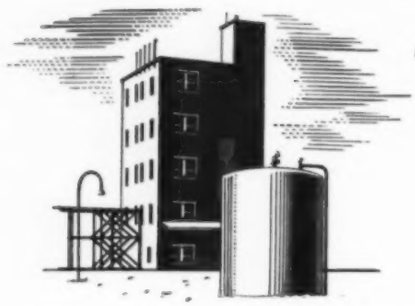
ST. REGIS BAG FILLING MACHINES

+ MULTIWALL =

St. Regis PAPER VALVE BAGS

BETTER PACKAGING AT LOWER COST

ROHM & HAAS PRODUCTS SERVE THE INDUSTRY



MANUFACTURERS

TECHNICAL DDT

TECHNICAL RHOTHANE

THE TRITONS—Wetting Agents and Emulsifiers for any insecticide formulation

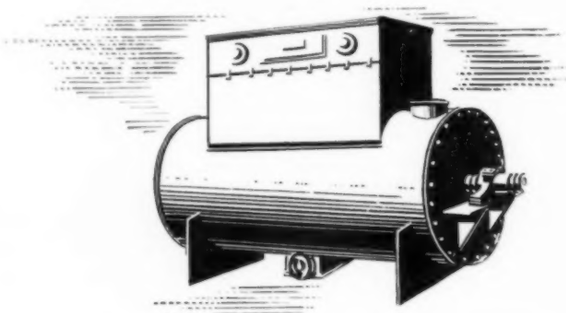
DUST MIXERS

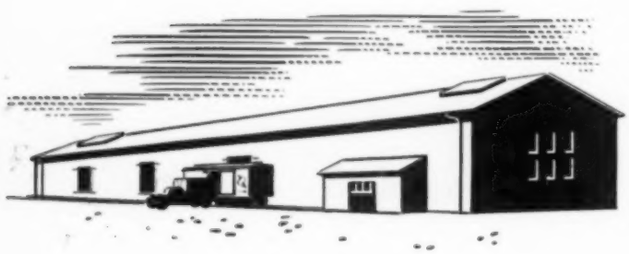
DITHANE Z-78—Organic Fungicide

YELLOW CUPROCIDE—Fixed Copper

D-50 DUST—50% DDT

RHOTHANE AD-50—50% RHOTHANE





DISTRIBUTORS

DITHANE D-14—5 and 30 gallon drums

DITHANE Z-78—3 lb. bags, 100 lb. drums

YELLOW CUPROCIDE—3 lb. bags, 100 lb. drums

D-50 WETTABLE POWDER—4 lb. bags, 50 lb. bags

25% DDT EMULSION CONCENTRATE
5-30-50 gallon drums

TRITON B-1956—Spreader-Sticker 1 and 5 gal. cans

WRITE FOR FULL DETAILS

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents
Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries

OBERDORFER BRONZE PUMPS

NORTH AMERICAN *Standard* ...

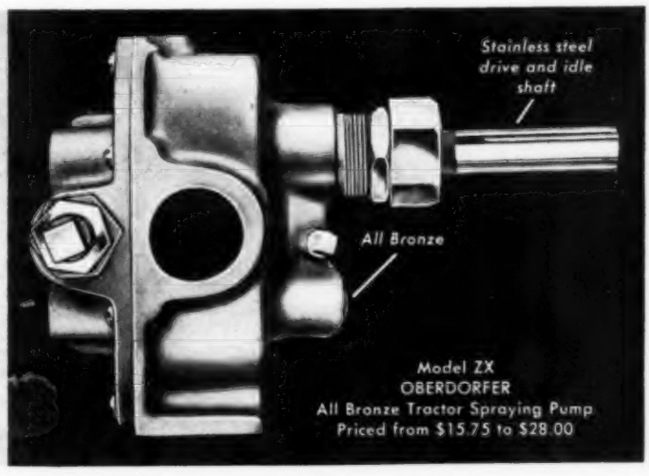
for weed spraying equipment

During the past year qualified members of this organization have travelled over one hundred and fifty thousand miles to determine the extent of use and the effectiveness of Oberdorfer Bronze rotary gear pumps in spraying the many commercial chemicals used extensively for Weed Control on outstanding farm crops throughout the United States and Canada.

Hundreds of men interested in spraying development were interviewed: Farmers, County Farm Agents, Weed Commissioners and Farm Equipment dealers; State, Federal, Provincial and Dominion agricultural specialists; many members of several of the great commodity exchanges as well as manufacturers of both chemical sprays and spraying equipment.

Using the opinion of the above group of men as our authority, we say to you that Oberdorfer Bronze Rotary Gear pumps should be on the equipment used to spray most of the acreage in the United States and Canada. Based upon our present rate of production of these inexpensive pumps, we advise you that no piece of spraying equipment need be built without the many advantages afforded by the Oberdorfer Pump.

If the Oberdorfer Bronze Pump is on your spraying equipment you are using the North American Standard, according to the men who know spraying pumps. *The Oberdorfer name is cast on every Oberdorfer Pump.* There is no substitute.



1. No corrosion with bronze and stainless steel.
2. Pressures up to 150 pounds per square inch.
3. Built-in adjustable pressure relief valve.
4. Lower cost than iron of similar design.
5. No priming to 15 feet below pump.
6. Four large Alemite lubricated bearings.
7. Easily installed by any mechanic.
8. ¼", ⅜", ½", ¾" and 1" standard pipe connections.
9. Backed by 50 years of bronze pump manufacturing.
10. All metal — no rubber.

Oberdorfer Foundries, Inc., Agricultural Pump Division

5100 Thompson Rd. — Syracuse, N. Y.

A survey made last month of the state recommendations for rat control indicated that 95% mention and recommend the use of red squill in substantially the following words:

> "Red Squill is the safest bait for use by the general public. * * *
>
> "Red squill (powdered) should be mixed at the rate of 1 part squill to 9 parts bait. Be *sure to obtain squill with a guaranteed strength of at least '500 mg/kg'*. Red Squill is the safest of all rat poisons and is very effective when properly used."
>
> *(From "Fact Sheet," U. S. Department of Agriculture, Cooperating with Department of the Interior, Fish and Wildlife Service, November 1947)*

DETHDIET RED SQUILL POWDER and RODINE (liquid extract of red squill) assay 500 mg. kg. the new standard set up under the Federal Insecticide, Fungicide and Rodenticide Act.

This more potent red squill will serve in campaigns to reduce the rat population of the country. Last year rats destroyed 200 million bushels of grain urgently needed overseas. The U. S. Department of Agriculture, cooperating with the Department of the Interior, Fish and Wildlife Service and assisted by local groups over the entire country, is planning a broad conservation program through rat control.

Please write us for information on how you can prepare to meet the demand for red squill which will inevitably result from the wide publicity to be given these conservation measures.

THE EDITOR COMMENTS

ADVISING a large grower in Florida on effective seed treatment to control black rot and black leg of cabbage, a well-known plant pathologist outlined the procedure to be followed. He then continued along the line of sources of infection. In this connection, he commented: "Unless it is certain that the manure is not contaminated, it is much safer to use commercial fertilizers."

We feel that this statement is significant far beyond its use in connection with the plant disease problem of a single large grower. If there is one medium which is undoubtedly ideal for the spread of plant diseases over wide areas, manure or other organic matter should be that medium. Their very method of handling and use constitute an effective system for the spreading of infection. Not that we aim here to belittle the value of natural manures, but merely that we feel this is a point which their advocates should not overlook when they seek to throw the harpoon into chemical fertilizers. There is more than one side to this fertilizer picture.

OF the great volume of worthwhile information to come out of the recent A.I.F. Association meeting in Washton, some of the comments made by Dr. Nathan E. Van Stone regarding the future for herbicides as a potent aid in the production of more foodstuffs, were of particular interest to the trade. He reported enthusiastic reports from all sections of the country in reply to a questionnaire sent out to Land Grant colleges across the nation, inquiring about what increases in food, grain, meat, and milk could be obtained by proper use of 2,4-D. A number of these quotations appear in the AIF meeting report in this issue, but the gist of them all is that chemical herbicides are on the threshhold of a tremendous expansion; that thus far the surface has hardly been scratched; that plans already under way call for application of 2,4-D to many thousands of additional acres in 1948.

In Canada, for instance, the report stated that last year some 500,000 acres were treated and carefully watched by Dominion authorities. The result was the production of an extra 1,500,000 bushels of wheat. In 1948, they indicate that 7,000,000 acres will be treated in Western Canada, and that the additional production will amount to an estimated 21 million bushels of wheat.

Figures such as these, coming from authoritative sources, lend credence to the prediction being heard frequently these days, that the herbicide field will develop eventually into a business exceeding in dollar volume both insecticide and fungicide sales.

Such an expansion, needless to say, would be welcomed by the grower, but more important, the further introduction of chemical weed killers in the pesticide field should become an important addition to the annual volume done by dealers in agricultural chemicals.

JUDGING from the amounts of publicity material put out by the U. S. Fish and Wildlife Service to promote control of rats in the interest of conserving stored foodstuffs, dealers in rodent control materials should bear in mind the potential extra volume of sales which may reasonably be expected to accrue from this widespread advertising. Wholesalers and retailers alike are

urged to estimate their needs on the local basis and place orders as soon as possible. Manufacturers may thus have a more accurate idea for production schedules.

Numerous advertising mats have been sent by the Fish and Wildlife Service to publications the country over, and circulars by the hundreds of thousands have been distributed. Many of these have reached our office, and we think that it would be strange indeed if there is not an upward surge in demand for chemicals to control destructive rodents as soon as this campaign has soaked into public consciousness.

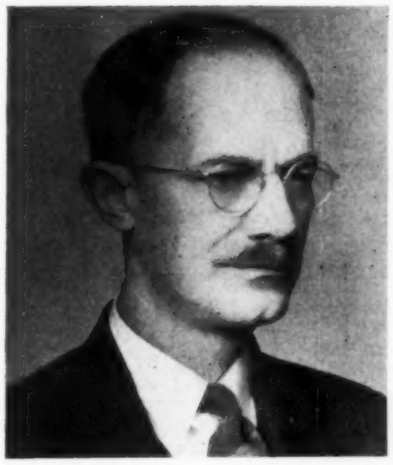
It would be redundant for us to recite again the sobering losses brought about by rats each year in the U. S. But it can hardly be repeated too many times, that to correct the situtation many tons of rodenticides must be used annually. Our collective job is to help promote the idea, then to have the goods on hand ready to satisfy the demand.

OF any single factor exists upon which the over-all prosperity of the fertilizer, insecticide, fungicide, and allied agricultural chemical manufacturer depends more than any other, it is the level of general farm income of the nation. Over the years, when farm income has been high, sales of agricultural chemicals and farm equipment have invariably shown an increase. When agricultural prosperity has been at low ebb, the reverse has been true. No matter how badly the orchardist or grower may need a new tractor or a few tons of fertilizer or insecticide, if he does not have the ready money, he hesitates to buy. And he has the funds only when he is getting a good price for his crops and making money.

All this is, of course, elementary and only too well known to every manufacturer and dealer in the agricultural chemical field. But we might be inclined to forget the basic facts in the hustle and bustle of present operations. All activities directed toward holding agricultural commodity prices at profitable levels, — and that does not mean the inflationary levels preceding the recent market break, — have a direct beneficial bearing on the demand for agricultural chemicals. Whether we agree or disagree with the economic philosophy behind support prices, everything which industry can do to keep farm income at high levels is obviously in its own interest. As a barometer of what is coming in agricultural chemical sales, the farm income figure has been unfailing.

COMMENTING on the everlasting word-battle carried on mostly by advocates of natural organic fertilizer materials against chemical plant foods, the American Potash Institute in a recent news letter quoted E. M. Hunt in *Minnesota Horticulturist* to the effect that there is actually no basis for controversy in the minds of the well informed. The value of natural organic matter in the soil has been well known and undisputed for years, he states, but let us recognize as well that chemical fertilizers are a powerful tool which cannot be ignored.

Looking back over the past five or six years of the war and post-war periods, we wonder just how far vitally needed expansion in food production would have gone without the practical aid of chemical fertilizers. We may theorize on soil conservation, we may argue endlessly about the value of natural organics in the soil and there will be no dispute. But when we must have a billion ton food output quickly and there is no time for the consideration of academic arguments, chemical fertilizers obviously have supplied the practical answer. The chemical fertilizer people have never disputed the value of natural organic matter, but they also know that agriculture does not have time to split hairs when there is a big food production job to do,— and fast.



Guest Editorial written especially for this issue of Agricultural Chemicals.

WEED CONTROL
... a career for young men

By C. J. Willard

President, North Central Weed Control Conference

MAJOR farm pests in the U. S. in order of their importance, consist mainly of weeds, insects, and plant disease. If one were to criss-cross the country and question individual farmers about their problems, there would be hardly one who would have no weed problems, whereas some would have practically no insect nor plant disease problems.

Estimates of the total losses due to weeds have been uniformly greater than estimates of the total losses from insects affecting plants or from plant diseases. Nevertheless, there is relatively little attention paid to weed control, although we have had a Bureau of Entomology in the U. S. Department of Agriculture almost from the beginning, and plant pathology is recognized in the names of several divisions as "Division of Forage Crops and Diseases," "Division of Cereal Crops and Diseases," etc. There are probably at least two thousand professional entomologists in the United States and possibly half that many professional plant pathologists. Ten years ago one could have counted on his fingers the men who were giving full time to publicly supported weed control research. The situation is not greatly better today.

This lack of attention to weed control is not due to lack of farm interests. Any extension agronomist will testify that farmers are always vitally interested in methods of controlling weeds. Why, then, has there been so little research interest in the subject? Largely, I believe, from the lack of dynamic new approaches to the problem. As long as every known method of weed control had been used since the primeval curse on Adam, there was not much interest in weed control research.

A passing fever of weed research was started by sodium arsenite and iron sulphate from 1900 to 1910. The discovery of sodium chlorate as a herbicide about 1926 resulted in a comparatively large amount of weed control research. During

(*Turn to Page 79*)

What's the Fertilizer Picture For 1948? An Expert Discusses

WORLD NITROGEN NEEDS

THE shortage of nitrogen fertilizer is one of the serious problems facing the world today — a world in which more than half of the people are underfed. World population has been increasing, but food production has not increased enough to meet the minimum needs of many people. A greater use of nitrogen fertilizer and other improved practices are necessary to obtain a higher level of food production in nearly all countries.

Although nitrogen fertilizer consumption in the United States is more than double prewar rate and food production has been increased more than 30 percent, such increases have not occurred in many other countries. The world stated nitrogen requirements for 1947-48 as presented by individual countries are about 30 percent greater than the available supply.

Of the three major plant foods: nitrogen, phosphate, and potash, nitrogen is the only one in such short supply that it has been continued under international allocation. The principal world use of inorganic chemical nitrogen is for fertilizer. However, this type of nitrogen represents only a part of the nitrogen applied to soils for increasing plant growth.

The world supplies of nitrogen for fertilizer for 1947-48 are slightly higher than in prewar years and considerably above the very low point reached in many countries at the close of World War II.

Table I divides the world into five principal continental areas and shows the prewar production and consumption of nitrogen fertilizer and estimated production, the stated requirements and the estimated supplies based on international allocation for each area for 1947-48. These figures do not include data for the U.S.S.R., the Balkan countries in Central Europe and the Russian occupied area of Germany, as comparable data are not available.

The world production in 1947-48 is larger than in the years before the war but distribution is considerably different. The prewar production in North America made up about 13 percent of the total and this year it will account for over 36 percent of the total commercial fertilizer nitrogen. Production of nitrogen fertilizer increased slightly in South America, is about the same in Europe, but decreased in Asia. The production in North America increased fourfold. In Germany and Japan, present production is less than prewar.

Nitrogen available for consumption in North and South America in 1947-48 is twice the quantity used in years before the war. In the other areas the supplies of nitrogen for fertilizer are only slightly greater than they were in prewar years. The requirements for North and South America are slightly more than twice the prewar consumption and the supplies for 1947-48 are about 90 percent of the amount requested. The requirements for Western Europe and Asia are about 50 percent greater than the quantities used about a decade ago. Nitrogen supplies of

TABLE I
NITROGEN FOR FERTILIZER
(Thousands short tons)

Area	Prewar annual [1]		1947-48 Estimated Production	1947-48 Stated Requirements	1947-48 Estimated Supplies
	Production	Consumption			
Western Europe	1,275	1,174	1,303	1,849	1,394
North America	280	416	1,109	927	843
South America	273	38	348	97	84
Asia	381	515	251	832	539
Other	7	133	8	238	155
Totals	2,216	2,276	3,019	3,943	3,015

[1] Source: International Emergency Food Council report of Secretary-General to Fourth Meeting of the Council July 1947, pp. 68-69, table 20.

by

W. F. Watkins

Production and Marketing Administration
United States Department of Agriculture
Washington, D. C.

Western Europe and Asia are 75 and 65 percent respectively of the stated requirements.

Development of N. Industry

THE inorganic nitrogen fertilizer industry has seen its greatest development within the past century. The natural sodium nitrate industry of Chile began about 1831 when the first small shipments were made to the United States and England, but it was not until after 1880 that the industry in Chile became important. Inventions which led to the production of synthetic nitrogen appeared late in the 19th century and early in the present century, so that the entire synthetic nitrogen industry for the producion of inorganic chemical nitrogen was developed in the last fifty years. The major synthetic ammonia plants were built after World War I, most of them in Western Europe with some plants in the United States, Canada and Japan.

During this century of progress in production of inorganic nitrogen, marked increases in world population have occurred. In 1830 the world population was only about 800 million people. This was more than doubled in the subsequent 100 years and is now over 2 billion. World population is increasing about 20 million a year and may reach 3 billion by the end of this century.

Increased food production is necessary to provide adequate nutrition of the present population and to meet the needs of the growing population. During the last century large areas of new agricultural lands were brought under cultivation, especially in the temperate zones. Most of these lands have been farmed from 50 to 100 years and only limited areas have not been fully explored and put in use. Increased food production must be obtained at least partially from higher per acre crop yields. Increasing amounts of nitrogen and other commercial plant foods will be necessary to bring this about.

1948 Consumption

IN 1947-48 the per capita consumption of commercial fertilizer nitrogen in Western Europe will average about 11 pounds per person. About the same rate will prevail in North America. In South America it will be about 2 pounds and in Asia only about 1 pound per person. The density of population in Europe is about twice that of Asia and six times as great as in North America. In China there is only about one-half acre of crop land per person, in India about three-fourths acre, while in the United States we have over two and one-half acres of crop land per person.

With the increase in population, great industrial areas have deloped in some sections of the world, principally in Western Europe, the United States and in Japan. Before the last war about two-thirds of the synthetic nitrogen industry was in the industrial area of Western Europe. This same area consumed over one-half of the commercial nitrogen fertilizer and about two-thirds of the total quantity of commercial fertilizer (nitrogen, phosphate and potash). This increase in use of nitrogen and other fertilizers greatly increased crop yields in these countries during a fifty year period beginning in 1880. Little commercial plant food was used in agriculture before this date.

Table II, shows the increase in wheat yields in some Western European countries in a half century.

The Netherlands and Belgium showed by far the greatest percentage of increase, but Germany was not far behind. Plant food added to the soil played a major role in these production achievements.

TABLE II

WHEAT YIELDS IN BUSHELS PER ACRE

Country	1881-85	1933-37	Percent Increase
France	18	24	33
Germany	22	32	45
Belgium	26	39	50
Netherlands	26	46	77
Denmark	33	47	42

All of this increase in crop yields was of course not due entirely to the use of commercial fertilizer. Many other improved farm practices played a part in increasing crop production during this half century.

Another example of the importance of nitrogen and other fertilizers in increasing food production occurred in the United Kingdom during the recent war. The cropland acreage was increased about 50 percent, and even though much of it was classed as "poor" land, per acre yields were maintained and in some cases increased. At the same time in the United Kingdom the use of nitrogen fertilizer was increased nearly three times from 60,000 tons of nitrogen annually to about 180,000 tons. During this same period, the quantity and quality of livestock manure decreased owing to a decline in livestock population and a shortage of imported protein feed.

The consumption of fertilizer nitrogen varied from country to country during and since the war as shown in the figure on page 26.

The average 1934-38 prewar consumption is taken at 100 and the consumption for each country since 1940-41 is shown as the percentage of the prewar average. The United Kingdom reached 250 percent of prewar in 1941-42 and has been maintained near or above this level to the present time. Norway has averaged more than double its prewar average since 1940-41. In the United States the consumption has shown a steady increase except for a slight drop in 1941-42. Consumption in Belgium, France and the Netherlands reached a low point of about 30 percent of

prewar in 1944-45, but in a short time recovered to above the quantity used before the war. For Japan, the consumption is shown on a calendar year basis. The low was reached in 1945, less than 20 percent of prewar, and in 1947-48 it is expected to be only 72 percent of the quantity used before the war.

Manure as N. Source

IN most countries the amount of commercial inorganic nitrogen used for fertilizer is much less than the amount of nitrogen applied to the soil in livestock manures. Before the war, the Netherlands, United Kingdom, Denmark and other countries imported large quantities of oil seed cake, oil seeds and other high protein livestock feed. In Denmark, scientists made a careful study of the amount of nitrogen applied to the soil. The results showed that 22 percent was received from commercial fertilizers and 78 percent from livestock manures, of which 15 percent, or about one-fifth, was from the nitrogen in the imported feeding stuff. During the war very little protein feed was imported into these Western European countries. According to reliable estimates the losses of nitrogen from livestock manures in these European countries in 1947-48 are much greater than the apparent increase in supply of commercial inorganic nitrogen over their pre-war consumption.

Industrial Use of N.

SO far, we have discussed primarily the use of commercial inorganic nitrogen for fertilizer. Although, this is the greatest outlet for commercial nitrogen, increasing quantities of nitrogen are going into industrial uses. Information on these industrial uses is less complete than on the amount being used for fertilizer, but it is known that considerable nitrogen tonnage in some countries is used industrially. These uses of nitrogen in Western Europe are estimated to be between 125,000 and 150,000 tons annually at present, and in North America about 400,000 tons. Thus the total world production of commercial nitrogen will be slightly above 3.5 million short tons in 1947-48.

World Trade

BEFORE the war, Chile was the largest exporter of nitrogen and Germany the second largest. In all, about twelve countries exported nitrogen before the war. Japan and Korea were practically self sufficient. At present, only five countries are net exporters of commercial nitrogen. They are Chile, Canada, Norway, Belgium and the United Kingdom ranked in order of the volume exported. Switzerland may export a very small amount. The United States becomes a net exporting country this year if the United States army ordnance production of 250,000 tons of nitrogen for use in occupied areas is added to the commercial production of private industry. Canada has increased exports from about 32,000 tons in prewar years to about 150,000 tons annually in the postwar years.

Production Capacity

IN 1940 the capacity of the nine synthetic nitrogen plants in the United States was about 390,000 tons and the three Canadian plants, about 85,000 tons, thus making a total synthetic nitrogen capacity of 475,000 tons a year in North America. This figure does not include the capacity for producing byproduct nitrogen which was estimated at 194,000 tons annually.

According to United States Tariff Commission Report No. 114, the capacity for producing synthetic nitrogen in western Europe including all of Germany was about 2,300 thousand tons in 1934. In addition

TABLE III

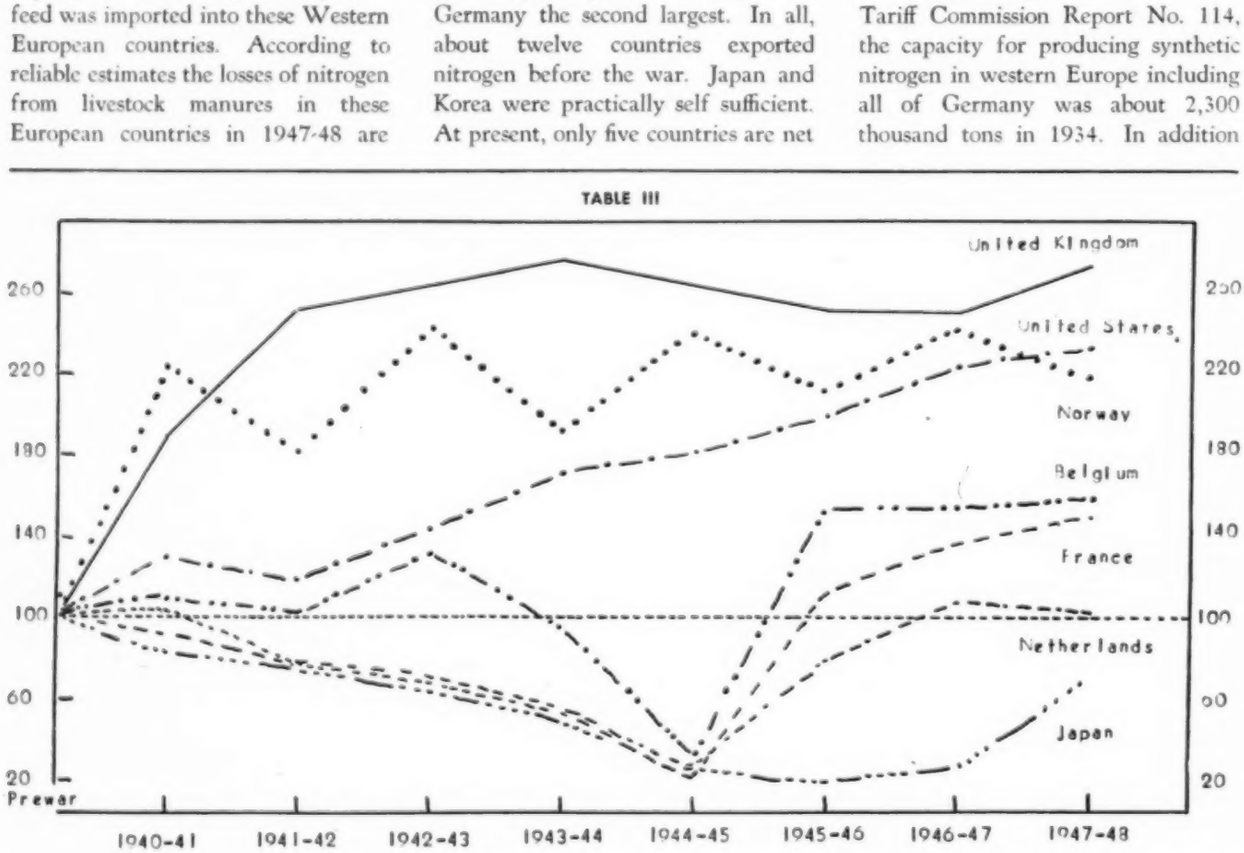


TABLE IV

Index of nitrogen consumption in selected countries, prewar, during the war and to date. Prewar consumption (1934-38) — 100.

Country	Prewar	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47	1947-48
United Kingdom	100	195	256	261	277	262	252	252	277
Netherlands	100	104	77	69	57	26	81	107	104
Belgium	100	110	104	133	97	33	154	157	158
France	100	95	77	74	58	31	114	139	150
Norway	100	226	183	241	193	242	213	241	219
United States	100	133	119	148	174	183	204	228	237
Japan	100	84	80	71	57	48	18	26	72

Prewar is the 1934-38 average as shown in the International Emergency Food Council Report of July 1947; for Japan the 1936-38 average is used, source, Fertilizers in Japan, Natural Resources Section Report No. 55, 1946.

The data for Japan are on a calendar year basis for all years except 1947-48 which is for the present fiscal year.

the countries in Western Europe were able to produce a large tonnage of cyamid and byproduct nitrogen.

Many new synthetic ammonia plants were built in United States and Canada in the early years of the war, on the other hand, nitrogen plants in Germany and other continental European countries and Japan were damaged and destroyed. Since 1940, the United States Government constructed ten synthetic ammonia plants with a designed annual capacity of 797,000 tons. The Canadian government built three additional plants with an estimated capacity of 136,000 tons. Thus, ammonia plants with production capacity of 933,000 tons nitrogen were constructed by the respective governments in North America after 1940. In addition the capacity of private synthetic ammonia plants in the U. S. was increased about 41,000 tons from 1940 to 1945.

All of the Canadian plants shifted to operation by private industry after the close of the war. In the United States five plants with a designed annual capacity of 399,000 tons were sold or leased to private industry. The Muscle Shoals plant with a capacity of 50,000 tons annually is being operated by the Tennessee Valley Authority for production of nitrogen fertilizer. Thus, in North America the capacity of synthetic ammonia plants producing nitrogen distributed through commercial channels has been increased 626,000 tons (132%) since 1940.

Three of the United States Government-built plants with a designed annual capacity of 304,000 tons are being operated by the Army to produce ammonia which is processed into ammonium nitrate fertilizer for use in occupied areas. The other United States Government-owned plant was turned over to the Bureau of Mines of the Department of the Interior for research on synthetic fuels.

When the commercial and government production of nitrogen for fertilizer and that for industrial purposes are added together, the results shows that the United States is now the largest producer of inorganic chemical nitrogen in the world. The total production of nitrogen in 1947-48 in North America will be approximately 1.5 million short tons, whereas production in Western Europe will be little more than 1.4 million tons. This is a considerable change from the situation that existed before the war when the production of nitrogen in Western Europe was three times as large as in North America.

Looking Ahead

IN the future, fertilizers can be expected to be an important factor in bringing food production of the world up to the quantity of nitrogen for fertilizer needed to achieve this increase in food production. However, it will be much more than is available and being used at present. The answer cannot be obtained by simply measuring crop responses to the application of nitrogen fertilizer and relating increased food production to the increased use of nitrogen. Other factors such as the use of other plant foods, the soil types, the level of soil productivity, climatic conditions, soil management practices, crop varieties, disease and insect control measures and the desire and ability of the people of the world to utilize modern scientific information must be considered. Greater use of nitrogen fertilizer will increase the per acre yields of crops.

It may seem ambitious to think of doubling the consumption of nitrogen fertilizer in individual countries or in continental areas, yet consumption in the United States and Canada has more than doubled within the last 10 years and present annual consumption in the United Kingdom is nearly three times the prewar use.

Fertilizer consumption targets for the future have been estimated by the Food and Agriculture Organization of the United Nations, by the Committee of European Economic Cooperation for several countries and by the United States Department of Agriculture for the United States. The Food and Agriculture Organization targets were arrived at by a group of scientists who reviewed the prewar use in each country, the rates of application, and the density of population in each country. The available evidence on crop responses and the future needs where published for individual countries were also studied.

The FAO report established targets for 1960 by continental areas. These suggested world targets were

(*Turn to Page* 77)

Need is seen for further study of the way 2,4-D is absorbed and carried throughout a plant, so users may understand better how & when to apply herbicides most effectively

2,4-D.... How it Kills Weeds

SINCE the discovery that 2,4-D could be used to kill some kinds of weeds, a great amount of valuable data has been accumulated from practical experiments regarding the kinds of plants this chemical will kill—forms of the chemical that can be used—and what effects these may have on crop plants. Although the results appear to be a bit confusing at times, these practical experiments have already gone a long way toward a true evaluation of 2,4-D as an herbicide.

Comparatively little effort has been spent, however, in learning how systemic plant poisons, such as 2,4-D, kill plants or why this chemical will kill some kinds of weeds and scarcely affect the growth of others which may be even more serious pests.

Although basic research on 2,4-D has been limited, we have, however, gained some knowledge as to how plants respond to this poison. Results of this research should be made clear to those making practical field tests with this type of herbicide.

Most basic research with 2,4-D has involved 3 separate fields of study: (1) the absorption and translocation of 2,4-D by plants, (2) the effect of 2,4-D on the growth and chemical composition of plants, and (3) the behavior of 2,4-D in soil.

Absorption, Translocation

KNOWLEDGE as to how plants absorb and translocate 2,4-D is of importance because the effectiveness of this herbicide in killing perennial plants depends to a large extent on the amount of the chemical that is translocated down into the roots.

2,4-D is apparently absorbed by living surface cells of most any part of the plant (13). It is very readily absorbed by roots, leaves, and stems. To be most effective as an herbicide, however, the chemical must not only be absorbed, but it must be translocated throughout the plant. The rate at which 2,4-D is translocated depends to a large extent upon where the chemical is applied. (10, 13).

Applied to Roots

MANY kinds of plants readily absorb 2,4-D when it is placed on their roots. Applied in this way, the chemical apparently is absorbed into the vascular system of the plant where it is carried upward in the transpiration stream to the above group parts. In this manner the chemical is readily distributed throughout the plant (10, 13). It apparently moves most readily from the roots to other parts of plants when the soil is moist, the air relatively dry, and the rate of transpiration high (13). Applied to roots, 2,4-D will move to the top of the plant even though a section of the stem has been killed. This is true because the chemical apparently travels from the roots up through the stem mainly in the non-living cells of the water conducting system.

The application of 2,4-D to the roots of weeds may present some difficulties from the standpoint of large scale practice. On the other hand, this method of application has received relatively little attention in comparison to work on top sprays. On the basis of the way the plants respond when their roots are treated under controlled greenhouse conditions, it would appear that soil treatments might well be tested further in an attempt to develop economical and effective ways of applying 2,4-D to the roots of perennial weeds.

by

John W. Mitchell *

Applied to Leaves

THE leaves of many kinds of plants also readily absorb 2,4-D. In considering absorption and translocation of 2,4-D by leaves, we are confronted with an entirely different picture than when the chemical is applied to roots. After the chemical is absorbed by a leaf, the material is apparently moved from the leaf to the stem and other parts of the plant only under certain conditions. Instead of translocating the chemical in the xylem or transpiration stream, the plant moves it from the leaves mainly *in living cells*, apparently in a manner similar to the way in which sugars and other carbohydrates are translocated. 2,4-D is translocated most readily from the leaves of a plant at a time when carbohydrates are being translocated from the leaf to other parts of the plant. Thus very young, rapidly growing leaves are relatively inefficient as far as the translocation of 2,4-D is concerned. Leaves growing in deep shade or in darkness and depleted of sugars are likewise relatively inefficient in translocating 2,4-D. On the basis of these results, leaves absorb and translocate 2,4-D most readily when they are fairly well expanded and grown in sunlight. This may explain in part the varied results obtained with 2,4-D in attempting to kill leafy weeds growing under a variety of environmental conditions.

The acid must penetrate the roots and other underground parts of perennial weeds to be effective in killing these plants, When leaves are treated, the movement of 2,4-D parallels to some extent the movement of carbohydrates. The chemical appears to be moved most readily from the top to the roots when carbohydrate reserves are being actively replenished in the roots. It might be expected, then, that 2,4-D would be most effective in killing roots if applied to the above ground parts after the stems and leaves are well developed. Theoretically, treatment of young rapidly growing sprouts of perennials would be relatively ineffective in killing the root.

With respect to old leaves, there is evidence that these may absorb and translocate 2,4-D less readily than do young fully expanded leaves. The growth of bean plants was checked more effectively when 2,4-D was applied to young expanded leaves than it was when applied to old leaves.[1] It has often been observed that plants respond most readily to the chemical during an active stage of growth. This might be expected—first, because plants apparently absorb and translocate the chemical most readily during this stage of development. Secondly, because 2,4-D affects physiological processes such as respiration, enzyme activity, utilization of reserve materials, and other growth processes. A chemical such as 2,4-D which stimulates these processes would theoretically be most effective if applied when these growth processes are most active.

Applied to Stems

WHEN placed on the stems of succulent plants, 2,4-D is very readily absorbed. Applied to the upper stem, (that portion bearing leaves) the chemical is apparently translocated both upward and downward. But when applied to the stem near the ground level, the stimulus is first mainly in a downward direction, and finally the effect moves to the upper part of the plant.

Applied to Flowers & Fruits

AS far as weed control is concerned, application of 2,4-D to the flowers and fruits of plants is of interest in connection with checking the development of pollen or weed seeds. It has been demonstrated that flowers and young fruits of some plants such as morning glory, ragweed and others are very sensitive to 2,4-D (3, 5). On the other hand, bean pods were not noticeably affected—when treated with a relatively large amount of 2,4-D just before picking time (7). As would be expected, growth regulators were not translocated readily from attached bean pots to other parts of the plants, since the flow of carbohydrate and nitrogenous materials is into the fruit, rather than from the fruit to other parts of the plant.

Effect on Plant Composition

MORNING glory and dandelion plants have been used by different workers to study the effect of 2,4-D on some carbohydrate and nitrogenous fractions of plants (9, 11). In these experiments careful growth measurements were made after the plants were sprayed with different amounts of the chemical.

Growth of leaves, stems and buds was completely checked by the treatment in the case of both kinds of plants. There was no evidence that the plants "grew themselves to death" since their overall dry weight failed to increase after the sprays were applied. Reserve carbohydrates (starch and dextrins) were reduced in the case of morning glory from about 15% at the beginning, to almost zero during a 3 week period immediately following treatment. The

* Sr. Physiologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, Beltsville, Maryland.

Paper delivered February 12, 1948, at Northeastern Weed Control Conference, Hotel Commodore, New York City.

1 Weaver, R. J., and Rose, H. R., Absorption and translocation of 2,4-dichlorophenoxyacetic acid. Bot. Gaz. 107: 507-521. 1946.

sugar content of the plants at first increased, but after 3 or 4 days began to decrease and reached a low level so that at the end of 3 weeks after treatment the plants were practically depleted of their supply of readily available carbohydrates. During the third week they turned brown and finally died.

Factors apparently responsible for the death of these morning glory plants include the inhibition of new growth, and the rapid depletion of readily available carbohydrates which these plants normally contain. Of course there may have been other factors which also partially accounted for their death. The depletion of food reserves, however, must have played an important part in the herbicidal action of 2,4-D in this case.

Rasmussen has reported that the reserve carbohydrates in dandelion sprayed with 2,4-D were reduced, but not sufficiently to account for the death of the plants. His measurements were made, however, on those plants that survived treatment and he states that some roots used in the final sample "appeared normal." He concludes that factors other than the loss of reserve carbohydrates may play an important part in the killing effect of 2,4-D.

Work by both Brown and Rasmussen (1, 11) indicates that the rate of respiration of plants nearly doubled following treatment with 2,4-D and that this effect may account in a large part for the rapid loss in reserve carbohydrates noted.

2,4-D Inactivation in Soil

SINCE 2,4-D is extremely toxic when applied to the roots of plants, there has been considerable interest as to how this chemical is affected when mixed with soil.

It was discovered several years ago that 2,4-D becomes inactivated when placed in contact with soil (8). It is now known that a number of environmental factors can greatly affect this rate of its inactivation.

How is 2,4-D inactivated by soil?—In early work with 2,4-D, it was noted that dandelions sprayed with the chemical during a rainy season died and quickly rotted away (5). Some kinds of micro-organisms were apparently able to grow readily on plants to which the chemical was applied. Later, laboratory tests showed that some molds grew vigorously in a media that contained sufficient 2,4-D to kill many kinds of common weeds (12). In other experiments, soil microbes were grown on media containing 2,4-D, and they apparently decomposed the chemical, thus inactivating it (6). Finally it was found that if 2,4-D were added to soil which had been heated so as to kill most of the molds and bacteria in it, then the chemical remained active while a like amount of the acid in unheated soil quickly lost its herbicidal activity (2).

It appears on the basis of these results that some microbes are at least partially responsible for the inactivation of 2,4-D in soil.

Other investigators have shown that 2,4-D is very readily absorbed by charcoal or other finely divided materials (4). It is reasonable to assume that 2,4-D may also be adsorbed by soil particles in such a way as to account partially for its inactivation.

Effect of Temperature

SOIL containing known amounts of 2,4-D has been stored at controlled temperatures ranging from 36 to 70°F., and the rate of inactivation of the chemical determined. 2,4-D retained its herbicidal activity when stored in soil at 36°F., but the rate of inactivation increased with an increase in storage temperature. It was concluded from this work that the rate of inactivation of 2,4-D in soil would not be seriously retarded unless the soil temperature dropped below about 50°.

Effect of Soil Moisture

THE rate of inactivation of 2,4-D in soil containing different amounts of moisture has been determined. The chemical retained practically all of its herbicidal activity when stored in relatively dry soil having a moisture content of 2.5%. On the other hand, 2,4-D applied at the rate of 4 pounds per acre lost approximately half of its activity during one month storage in soil having 10% moisture, and all its herbicidal activity in soil having 30% moisture. These results indicate that moisture is a critical factor and that 2,4-D is inactivated at a relatively slow rate when soil moisture falls below about 10%. When the chemical is applied to soil during a dry season, its effect can be expected to last a relatively long time.

Effect of Organic Matter

SINCE the growth of soil microbes apparently accounts in a large part for the inactivation of 2,4-D in soil, it would be expected that the chemical would remain active for a relatively long time when mixed with soil low in organic matter. 2,4-D applied at the rate of 10 lbs. per acre to soil relatively low in organic matter retained its full activity for a period of 1 month. When manure was added to a sample of this soil at the rate of 1000 pounds per acre—the 2,4-D lost more than half of its herbicidal activity within 3 weeks. Thus 2,4-D was inactivated at a relatively slow rate when mixed with soil low in organic matter and stored under controlled conditions of temperature and moisture.

Summary

A number of facts have resulted from basic research on 2,4-D and these should be kept in mind by those attempting to work out practical means whereby this chemical may be used more effectively as an herbicide.

First, it is known that 2,4-D is absorbed and translocated throughout plants very readily when the chemical is applied to their roots. Translocation of 2,4-D from the leaves and other above ground parts of plants is influenced by environmental conditions—the maximum rate of 2,4-D translocation occurring under conditions most favorable to the translocation of carbohydrates and other products of photosynthesis.

It is known that the depletion of reserve food materials in plants results when 2,4-D is applied and it is reasonable to suggest that any other chemical or mechanical treatment

(*Turn to Page* 81)

CHEMICALS...

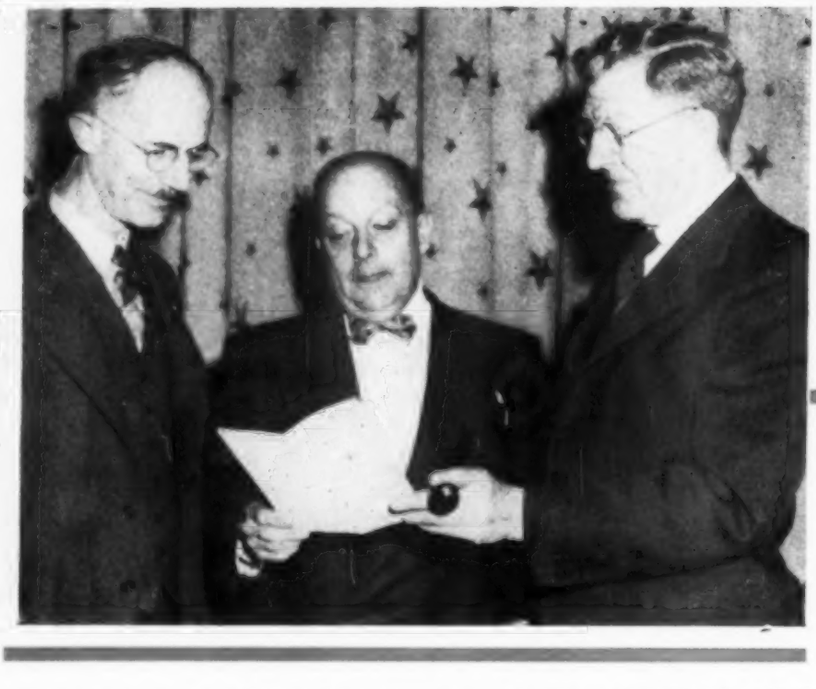
In Food Production and Conservation

This theme keynote of AIFA meeting in Washington, Feb. 19-20. . . . Preventable loss from insect and fungus damage over 30%, says Asst. Secretary of Agriculture. . . Van Stone discusses food production increase by weed control. . . Farmers must be kept posted, says Annand in forum of Government experts. . . Be ready for sudden plant disease and insect outbreaks, McCall warns . . . Ernest Hart presides in absence of President Leonard.

THE outstanding role of chemicals in the production and conservation of food and grain was discussed from many angles at the A.I.F.A. meeting of February 19 and 20, at the Statler Hotel, Washington, D. C. Speakers included not only representatives of the pesticide industry but officials of the U. S. Department of Agriculture, and representatives of a number of cooperating groups whose activities have a direct bearing on the pesticide trade and the progress of the national food conservation program. Also included on the A.I.F.A. program were editors of farm publications and directors of farm radio programs.

President George F. Leonard, Tobacco By-Products & Chemical Corp., Louisville, Ky. kept at home by illness, presented his address which was delivered by Ernest Hart, Niagara Sprayer & Chemical Division, Food Machinery Corp., Middleport, N. Y., who also acted as chairman of the meeting. In his paper Mr. Leonard emphasized the great need for cooperation of all persons in a position to lend assistance to the national program of food production and conservation. He stated that if the use of chemicals in food production is to be expanded, information must be taken out of files and put into widespread use through a program of education and publication of facts and figures. These new chemical methods were expected to be the accepted means of aid to food production within a few years under a normal rate of progress, he explained, so this

Radio Forum at A.I.F.A. Washington meeting. Left to right: Homer Martz, farm director, KDKA, Pittsburgh; Tom Page, farm director, WNBC, New York; Don Lerch, director of agriculture for the Columbia Broadcasting System; Phil Alampi, farm director, WJZ, New York; and Ken Gapen, chief of radio and video, U. S. Department of Agriculture.



Dr. C. J. Willard, North Central Weed Control Conference president, Lea S. Hitchner, executive secretary of AIF Association, and S. A. Rohwer, president of the American Association of Economic Entomologists confer at Washington meeting.

current program merely accelerates the rate of putting them into action.

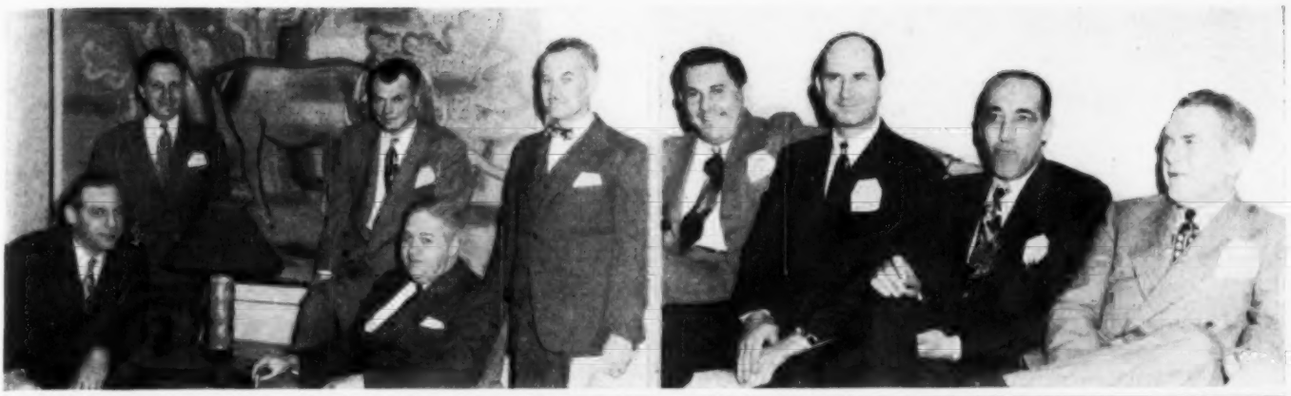
Dr. Charles F. Brannan, Assistant Secretary of Agriculture, substituted for Secretary Clinton P. Anderson whose duties elsewhere prevented his attendance at the A.I.F.A. meeting. Dr. Brannan stated that with the European Recovery Program and other expected demands upon the food production of the U. S., there will be a need to raise all the grain possible for the next several years. He pointed out that the conservation goal has been to make up the shortage of 100 million bushels in the proposed grain export plan, and that it now appears that half of this gap may be filled through current efforts. He also expressed a hope that with continued success "it may be that we can ship the entire extra 100 million bushels."

The U.S.D.A. is promoting the conservation program from three directions, Dr. Brannan said. These include more efficient production, more efficient utilization, and stopping waste. He cited the inefficiencies of allowing parasites to sap the energy and reduce the gains of growing livestock to the amount of nearly half a billion dollars annually; and in obtaining inferior yields from croplands which could produce abundant harvests if available technical knowledge were only applied. "We hope that this program will help turn the tide against all such inefficiencies," he said.

Although it is admittedly difficult to obtain precise figures on the extent to which the U. S. food supply is reduced each year by insects, fungus diseases, and rodents, Dr. Brannan quoted U.S.D.A. estimates that from 5 to 17 percent of important crops are destroyed by plant diseases; that insects destroy an average of about 10 percent of growing crops and another 5 percent while in storage. This stored grain destruction alone averages around 300 million bushels annually, he said, and rats destroy or injure perhaps another 200 million bushels of grain.

The pesticide industry was commended for its contributions in the insecticide, fungicide and herbicide fields, which through cooperation with government agencies have made "tremendously impressive" progress. He mentioned a number of new insecticides which have made better control possible, and cited the use of fungi-

Below: (first photo) Joseph Noone, Pennsylvania Salt Mfg. Co.; Dr. P. N. Annand, chief, Bureau of Entomology and Plant Quarantine, U.S.D.A.; I. P. MacNair, Agricultural Chemicals. Second photo: Dr. James G. Sanders, Commercial Solvents Corp.; and Friar Thompson, R. J. Prentiss Co.



cides in bringing about greater production of fruit by controlling various diseases. Progress in the control of both seed-borne and soil-borne fungus diseases was mentioned, as was the utilization of seed treatments for better production of various grains and vegetables.

The expanded use of herbicides in weed control was predicted by the Secretary who mentioned 2,4-D as having great promise in corn production. If it works out as expected, "it might be possible to 'lay by' corn before it has ever come up," he said.

The heavy responsibility resting upon industry for the thorough testing of new toxicants before putting them on the market was stressed by Dr. Brannan. A great deal of improvement has been made in industry during the past 10 years, he said, but some firms still have a long way to go. These few, putting inferior or dangerous materials on the market, endanger the reputations of legitimate and conscientous producers. The

First photo, left to right: J. Newton Hall, Julius Hyman & Co; C. Y. Haas, Attapulgus Clay Co.; D. C. Van Winkle, Julius Hyman & Co.; John A. Rodda, U. S. Industrial Chemicals, Inc.; M. J. Bunnell, Geigy Company, Inc. Second photo: Ted Riedeberg, McLaughlin Gormley King Co.; R. F. Byrnes, Rohm & Haas Co., Inc.; Jack V. Miller, Atlas Powder Co.; and John Powell, John Powell & Co., Inc.

Van Stone Estimates Savings

Dr. Nathan E. Van Stone, vice-president of Sherwin-Williams Co., Cleveland, Ohio continued the discussion, pointing out the part played by the agricultural chemical industry in the world food problem. He stated that the industry has kept faith with farmers in anticipating pests and in preparing for their appearance by storing quantities of materials for future use. During the war years when many of the regularly-used insecticides and other pest control materials were in short supply, worthy substitutes were developed by industry so that no serious loss to the nation's crops was experienced in those critical times.

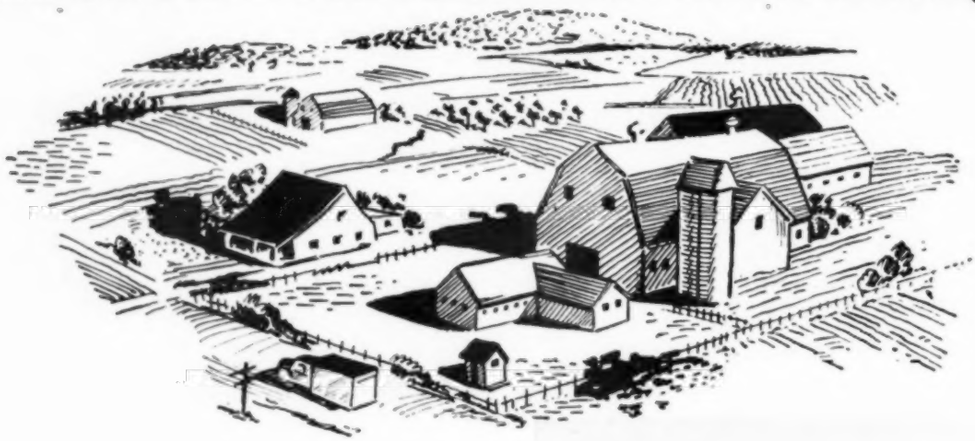
Speaking of losses through various kinds of pests, Dr. Van Stone stated that if all such losses from insects, fungi and weeds were added up, their total would amount to more than the cash outlay suggested by the Senate committee for the first year's contemplated cost of the Marshall Plan.

In order to form a basis for such estimates, Dr. Van Stone sent out a questionaire to land grant colleges from coast to coast, inquiring how much additional produce could be raised in their territories by use of 2,4-D to control weeds. Some of the replies were reported by the speaker as follows: the University of Wisconsin estimated an increase in oats of

Below, first photo: C. M. Gibbs, Merck & Co.; W. R. E. Andrews, Brooklyne Chemical Works; Dr. C. C. Compton, Julius Hyman & Co.; Edwin J. Camson, Orbis Products Corp. Second photo: R. O. Hartley, Velsicol Corp.; R. Wayne Mills, United Cooperatives, Inc.; Dr. R. W. Phillips, FAO; and David Lynch, Velsicol Corp.

TOXAPHENE

(HERCULES CHLORINATED CAMPHENE)



Large-scale field tests on thousands of acres of farm land throughout the United States give overwhelming proof that Toxaphene* (Hercules chlorinated camphene) provides effective, low-cost control over many insects that plague the farmer.

During 1947, state entomologists, experiment stations, and other agricultural authorities used over 2,000,000 lbs. of 20% Toxaphene dust to test its effectiveness against cotton insects and other pests.

For 1948, chlorinated camphene dusts are recommended for the control of all important harmful cotton insects. Specific recommendations on the use of chlorinated camphene can be obtained from individual state authorities. For further technical information on this promising new toxicant, write us.

Hercules does not make finished dusts but supplies technical grade chlorinated camphene. Get in touch with your agricultural insecticide manufacturer or supplier for information on dust concentrates or finished dusts containing chlorinated camphene.

CONTROLS

BOLL WEEVIL

BOLLWORM

SOUTHERN GREEN STINK BUG

GRASSHOPPER

COTTON LEAFWORM

COTTON APHID

RAPID PLANT BUG

TARNISHED PLANT BUG

COTTON FLEAHOPPER

MORMON CRICKETS

THRIPS

MANY OTHER AGRICULTURAL INSECT PESTS

*TRADE-MARK OF HERCULES POWDER CO.

HERCULES POWDER COMPANY

INCORPORATED

970 MARKET ST., WILMINGTON 99, DELAWARE

1,340,000 bushels, in corn of 1,013,000 bushels, and several thouand extra tons of hay. If used on pastures, the university predicted that use of 2,4-D would mean the production of 71 million extra pounds of milk.

Iowa State College stated that with other things being equal, an over all increase of 15 percent might be expected through use of 2,4-D in that area. Oklahoma Agricultural College estimated an increase of 20 to 25 percent in grass pastures, if weeds were eliminated; and Oregon State College stated that increases of from 25 to 100 percent might be expected in grain production through use of herbicides to kill weeds. In use on pastureland, one additional animal per acre could be supported, the college estimated.

Colorado Agricultural College reported an increase in barley production of from 67 to 77 bushels per acre when weeds were eliminated from the fields there; and Rutgers University termed 2,4-D the greatest discovery of agricultural importance since the development of hybrid seed corn.

The Canadian department of agriculture reported that 1,500,000 additional bushels of wheat were available in Canada in 1947 through the use of 2,4-D on a half-million acres. In 1948, a total of 7 million acres may be treated with an anticipated production of 21 million extra bushels of wheat. The government said further that eventually some 25 millions acres of wheat may be treated, with a "bonus" of 100 million additional bushels of production.

In conclusion, Dr. Van Stone reiterated that much further education is needed for those who use the newly-developed materials in crop production. However, with proper use of herbicides and other pest control chemicals, much of the large production program will be met.

Keep Farm Income High

HERBERT W. Voorhees, Trenton N. J., president of the New Jersey Farm Bureau and a director of the American Farm Bureau Federation, told the group that farm income will greatly influence the attitude of the farmer toward producing bumper crops. He warned that a drastic decline in food production might have a serious effect not only upon our commitments in exports and on our domestic economy, but it could make necessary further controls to the extent of changing the form of government.

Mr. Voorhees pointed out that when farm income drops off, the agriculturalist crosses off his shopping list many items such as fence, fertilizer, and so on. He spends only what he is forced to spend, lets the far field go and works back toward the house. "Once the farmer stops spending, it goes around the wheel," he said.

Industry was called upon by Mr. Voorhees to help with farm legislative problems and to maintain with greater efficiency food distribution which in some cases has failed to keep pace with production improvements on the farm. He pointed out how farm production has increased some 30 percent within the past decade, despite the fact that fewer acres are under cultivation.

Mr. Voohees urged the industry to make 1948 a year of action. "The decision is already made," he said, so the remaining thing to be done, is to carry out the program now under way. He left with a final warning, that without maintaining heavy food production, we can lose the entire war effort.

Jones Reports on Europe

JOHN Paul Jones, assistant to the General Manager of Stauffer Chemical Co., reported on his recent visit to Europe. His observations were made in the countries of Portugal, Spain, France, Germany and England, and in all these places a lack of food was evident upon close investigation. In some countries, however, there were fair stocks in stores, but the people had no money with which to buy. In Germany, he said, many workers are on the job only three days of the week . . . the remainder of the time being devoted to seeking food and other necessities for the family.

Carroll P. Streeter, managing editor of the *Farm Journal*, told the group that making more money and at the same time saving labor are two matters in which every farmer is interested. It is therefore necesary to tell the grower of the advantages of chemical pest conrol, and these methods can follow the meteoric upward path of hybrid corn. He pointed out the parallel between the introduction of hybrid corn and the advent of the chemical era on the farm.

Fifteen years ago only about 3 percent of the U. S. corn acreage was planted to hybrid seed. Today more than 80 percent is hybrid, and in some states the use is nearly 100 percent. "Why did hybrid corn catch on so quickly," he asked. "Because farmers could see that it meant more money right now. It was easy to make the changeover, and it didn't cost much." Mr. Streeter then brought out that the merchandise made by the pesticide industry is of similar nature. In fact, these products have become one of the liveliest fields on the agricultural scene. The duster and sprayer have won a place on the modern farm alongside the plow, the mower and the familiar manure spreader.

The afternoon session was opened with a talk by Robert C. Jackson, representing the National Cotton Council of America. He emphasized the fact that cotton should not be regarded as important only in a fiber sense, but it has an important food role, too. To bring out this fact, he cited the 1946 cotton loss from insects, estimated at 15½ percent. These parasites destroyed some 613,0000 tons of cotton seed which would have made 179 million pounds of cottonseed oil, or 200 million pounds of margarine. Or, it could have been the basis for 276,000 tons of high protein meal, which, if fed to hogs would have produced some 152,000 tons of meat. "Destroying cotton is destroying food," Mr. Jackson affirmed.

Harking back to the war years, Mr. Jackson recalled that cotton was rated second only to steel among strategic materials. Clothing is a necessity in all countries, and the economy of most nations is related directly to the cotton industry. The

cotton surplus became a blessing when extra production was demanded, he said.

The pesticide industry was commended for its job in controlling cotton insects in the south. The cotton grower can never do an efficient job when insects destroy 10 percent of his crop each year, the speaker declared. Correcting this condition is a task too great for any one group, public or private. It is a matter of publicity and education to put into use the knowledge already existing on insect control.

Government Forum

WITH S. A. Rohwer as chairman, the remainder of the Thursday afternoon session was devoted to a forum of speakers representing various bureaus and branches of the U.S.D.A. and other Government departments. Clarence Cottam, assistant director of the Fish and Wildlife Service discussed the destructive work of rats and other rodents. He pointed out that there are in all over 100 species of mammals in the U. S. which destroy crops in one way or another, and that while control of their activities is much to be desired, complete extermination is neither possible nor practical. Some mammals, such as moles, have a beneficial function in addition to the harm they do. He said that while new rodenticides such as "Antu" and "1080," are very efficient, antidotes are needed for them to bring about wider and more safe usage.

The second speaker on the forum program was Dr. B. T. Shaw, Assistant Agricultural Research Administrator, U.S.D.A., who reviewed some figures on animal losses due to parasites. Between 500 million and a billion dollars annually are lost in livestock through parasites, he declared. Added to this is the unestimated but considerable loss of feed consumed by livestock which later die from disease caused by insect carriers. Also to be considered as an important loss item, is the noticeable inefficiency in animals infested by various insect parasites. Dr. Shaw emphasized the need for added research which he termed as "increasingly important." "If we desire progress in years to come, we must use research *now*," he stated.

Keep Farmer Posted—Annand

DR. P. N. Annand, chief of the Bureau of Entomology and Plant Quarantine, pointed out some of the over-all gains in control of various agricultural pests, but stated that there are many fields in which added research is needed. For instance, he told of good control of wooly aphid by predators, but this advantage was lessened when new insecticides were introduced which destroyed the predators. Further problems are brought about by fast air transportation between countries which has opened a new route for foreign insects to enter the U. S. Some of the most dangerous insects now in the U. S. have been introduced from abroad, such as the European corn borer, the Japanese beetle, the horn fly etc. Plant quarantine is regarded as an important feature in greater food production.

Dr. Annand emphasized that it is essential for insecticide supplies to be available when and where needed. Field observations and reports on insect conditions are helpful in determining the type of control material needed, and the amount that may be required. ."Intensive research over a wide field is necessary," he declared, "The immediate problem is to inform farmers of the advances made in the field . . . to make this information available to the ones who will use it."

Dr. C. M. Packard, in charge of the Division of Cereal and Forage Insect Investigations of the B.E.P.Q. pointed out that in the past, insects were largely controlled by cultural means, but modern advances in the chemical field have replaced the former methods. Outbreaks of grasshoppers, for instance, may be prevented by use of BHC, chlordane and various baits. Dr. Packard also cited the protection of stored grain as an effective effort toward food conservation, with more than 300 million bushels of grain destroyed annually while in storage. In this regard, he stated further that residual sprays are effective, but they cannot do a complete job without the application of sanitary methods to complement the work.

Dr. Harry H. Stage, assistant leader, Division of Insects Affecting Man and Animals, B.E.P.Q. restated the fact that insect parasites cost some 400 million a year, but indicated that improvement in control methods will reduce this figure substantially. He pointed out that in Kansas alone, a half-million cattle were sprayed last year for control of grub worms. This procedure is becoming an established practice in many of the cattle states. The screwworm population has been greatly reduced through cooperative efforts on the cattle ranges. DDT is still potent in protecting cattle. Dr. Stage told of two experiments in Florida and Kansas where many thousands of animals were treated, with the insect-free cattle gaining an average of 10 pounds apiece per month more than the check animals.

G. J. Haeussler, in charge of Insect Pest Survey and Information, B.E.P.Q., described various means of presenting "fact sheets" to cattle raisers in an educational effort. Leaflets for farmers have also been prepared in addition to radio programs, motion pictures on corn borer, and projection slides to spread information on correct use. He told how posters and exhibits on corn borer activities are prepared for showing at county fairs and other places where farmers gather, in an effort to disseminate more information.

Spot Stocks Needed—McCall

DR. M. A. McCall, assistant chief, Bureau of Plant Industry, Soils, and Agricultural Engineering, stressed the necessity of having on hand at the proper time and place, sufficient plant disease control materials to hold in check outbreaks likely to occur during the growing season. He cited for example late blight which has occurred on the eastern seaboard for the past two seasons. He emphasized the importance of breeding disease-resistant varieties of plants, and cited the instance of rust-resistant wheat which has now practically eliminated the disease in many sections.

In discussing 2,4-D briefly, he mentioned its beneficial effect in boosting wheat yield, but warned against misuse of the material. He told of the trouble resulting from the use of 2,4-D in rice fields where the particles were allowed to drift onto cotton areas which were damaged in various degrees as far away as 30 miles. Although no official limits of safety for 2,4-D are yet available, every user should realize the potential danger when susceptible plants are near, he said.

Dr. M. L. Wilson, Director of Extension, U.S.D.A., told the association that the mind of the modern farmer is open to accept scientific research in agriculture, and that the present problem is to put these improved methods into action. One of the problems of the Extension Service, he said, is to keep good county agents on the funds available.

Reporting on cooperative extension effort on the operational level, C. D. Lowe, chairman of the Extension Service Committee pointed out the great advances in the use of insecticides in 1947. He said that in 21 states nearly 17 million cattle were treated for control of grubs, flies and lice in 1947, and that in 18 other states, some 2,500,000 cattle were sprayed or dusted for control of various parasites. He said that these 18 states were making use of some 9,250 power sprayers, and that nearly 5000 additional spraying units are needed in these areas. Among the activities to be stepped up and expanded during the current year are corn borer control and control of cotton insects, Mr. Lowe said.

Last to appear on the government forum was S. R. Newell, deputy assistant administrator for the Production and Marketing Administration. He urged industry to complete registration under the Act of 1947, as soon as possible before the June 25 deadline. He discussed briefly the purpose of the Act, to guard the weapons used against insects and plant disease. He complimented industry for its cooperation, but added that there are still some "fringe" instances where manufacturers try to market new toxicants ahead of time.

The annual banquet was held at the Statler Thursday evening, with a series of industrial movies being shown following the meal. These included "Better Livestock," by National Livestock Loss Prevention Board and John Bean Manufacturing Co.; "Antu, Modern Pied Piper," by E. I. du Pont de Nemours & Co., Inc.; "Weed-No-More," by Sherwin-Williams Co.; "Report on DDT," by E. I. du Pont de Nemours & Co.; and "First in the Hearts of Farmers," by American Plant Food Council.

Contrasts Farm Methods

FRIDAY'S program was opened by acting chairman Ernest Hart, who introduced the first speaker, Dr. R. W. Phillips appearing in the place of F. L. McDougall, Counselor to the Director General, Food and Agriculture Organization of the United Nations. Dr. Phillips explained briefly the function and purpose of the F.A.O., pointing out the manner in which the organization fits into the A.I.F.A. program. He mentioned that the food problem is world-wide, and is aggravated by large increases in population in most countries. Farming methods in China were contrasted with those of the U. S. In the former country, the average farm is about 3 acres in size, and even this small area is broken into smaller parcels so that the grower must move his equipment from place to place to carry on his work Economically, the country is divided between the grain-growing region and the rest of the land, which brings more problems in the matter of distribution.

The F.A.O. services include furnishing statistical service on a world-wide basis, sending missions into countries requesting such aid, then, holding meetings of specialists, and trying to develop cooperation among scientists in different parts of the world. Dr. Phillips emphasized the necessity for countries doing things for themselves after being given a start by the U. N.

Wesley Hardenbergh, president of the American Meat Institute, Chicago, stated that his industry is whole-heartedly supporting the food and feed conservation program. He warned that greatly increasing populations will mean the production of much more food, particularly since in the U. S., the food consumed per person has increased substantially. He said that the increase must be on a per acre basis, since most of the world's tillable lands are already under cultivation. This calls for increased use of scientific methods.

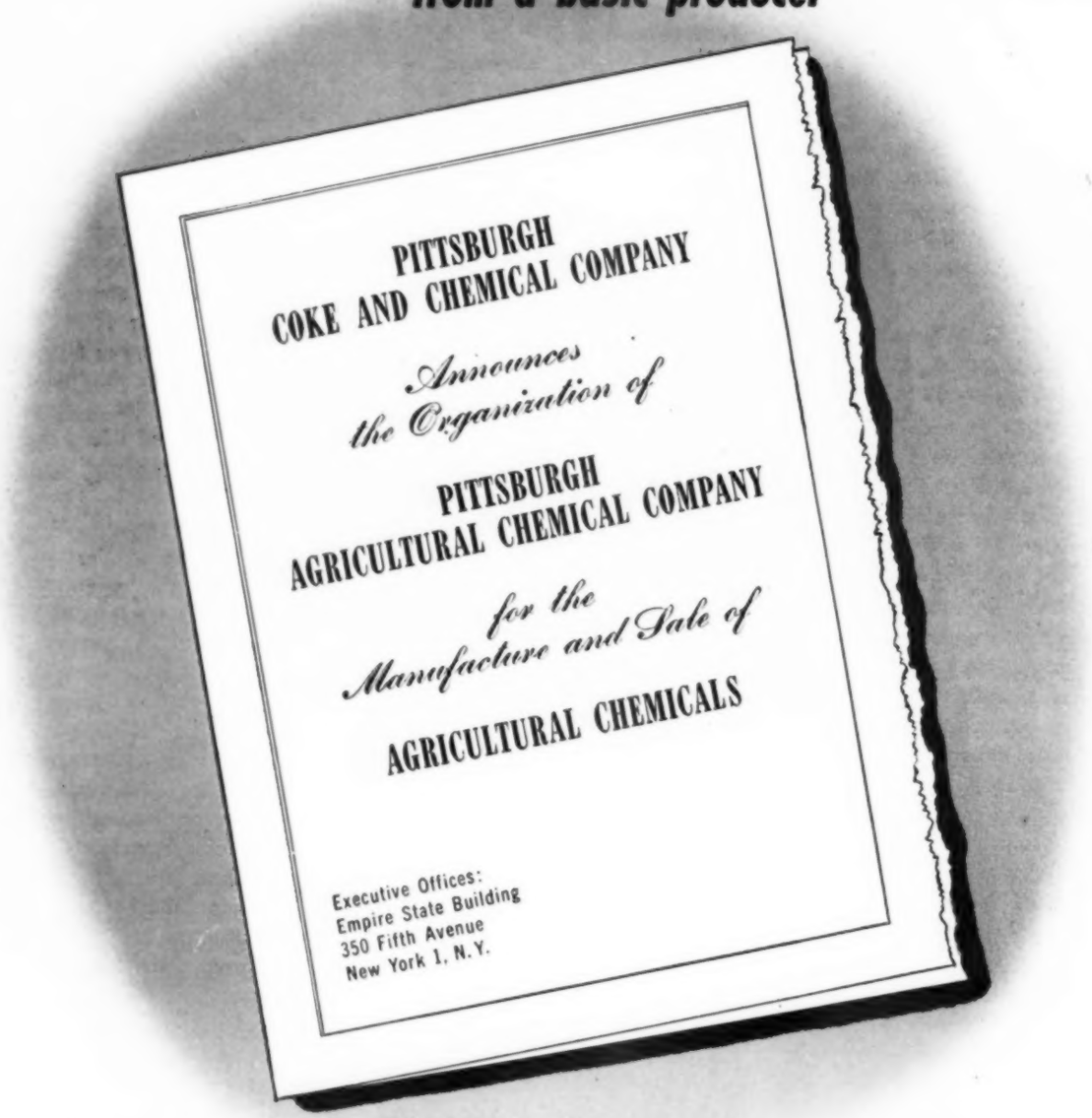
Mr. Hardenbergh asserted that increased livestock growing in the U. S. is advisable, since it can upgrade the American diet and health, create a food reserve on the hoof, and help preserve the fertility of soil. He denied that livestock consume large quantities of wheat and other food grains. "Actually, less than 5 percent of our wheat production is used for feed; corn, which is used only to limited extent for human food or drink, is the preeminent feed. Moreover, 80 percent of all beef and 50 percent of all meat produced in this country is produced from grass and forage, and from feed other than any kind of grain," he said.

The subject of increasing food production in 1948 through the use of herbicides was discussed by Dr. C. J. Willard, Ohio State University, presi- of the North Central Weed Control Conference. Dr. Willard declared that agriculture is at the dawn of a new day in weed control, and that the future will see chemical control of weed pests with greatly reduced human labor and expense. He told of experiments in chemical weeding of wheat in Kansas, where 3 extra bushels of wheat per acre were realized. The whole advantage of weed-free wheat is not shown in extra production alone, since the harvest may be facilitated greatly with clean wheat. Certain weeds among wheat impart unwanted flavors, and it is impossible to avoid this condition without chemical control.

Dr. Willard pointed out again how corn in bottom lands may be aided through the elimination of weeds by 2,4-D. Other projects for this herbicide include knocking down of garlic in wheat and eliminating thistle patches in pastures.

(*Turn to Page 75*)

NOW... AGRICULTURAL CHEMICALS
from a basic producer



This affiliation makes available for the first time a source of synthetic organic agricultural chemicals in form suitable for application . . . produced by one manufacturer and controlled in each stage of processing from the lump of coal to the ready-to-package product.

For many years a producer of coal-chemicals, Pittsburgh Coke and Chemical Company has more recently been converting these basic organic materials into a number of the new chemicals which are rapidly supplanting inorganic chemicals and botanicals in agriculture. To this manufacturing source the affiliation of Pittsburgh Agricultural Chemical Company adds plant pathologists, entomologists, agronomists and chemists trained in the researching, formulation and marketing of agricultural chemicals. A wide variety of insecticides, fungicides, rodenticides and germicides will result . . . all manufactured, formulated, tested and shipped from the Neville Island plant.

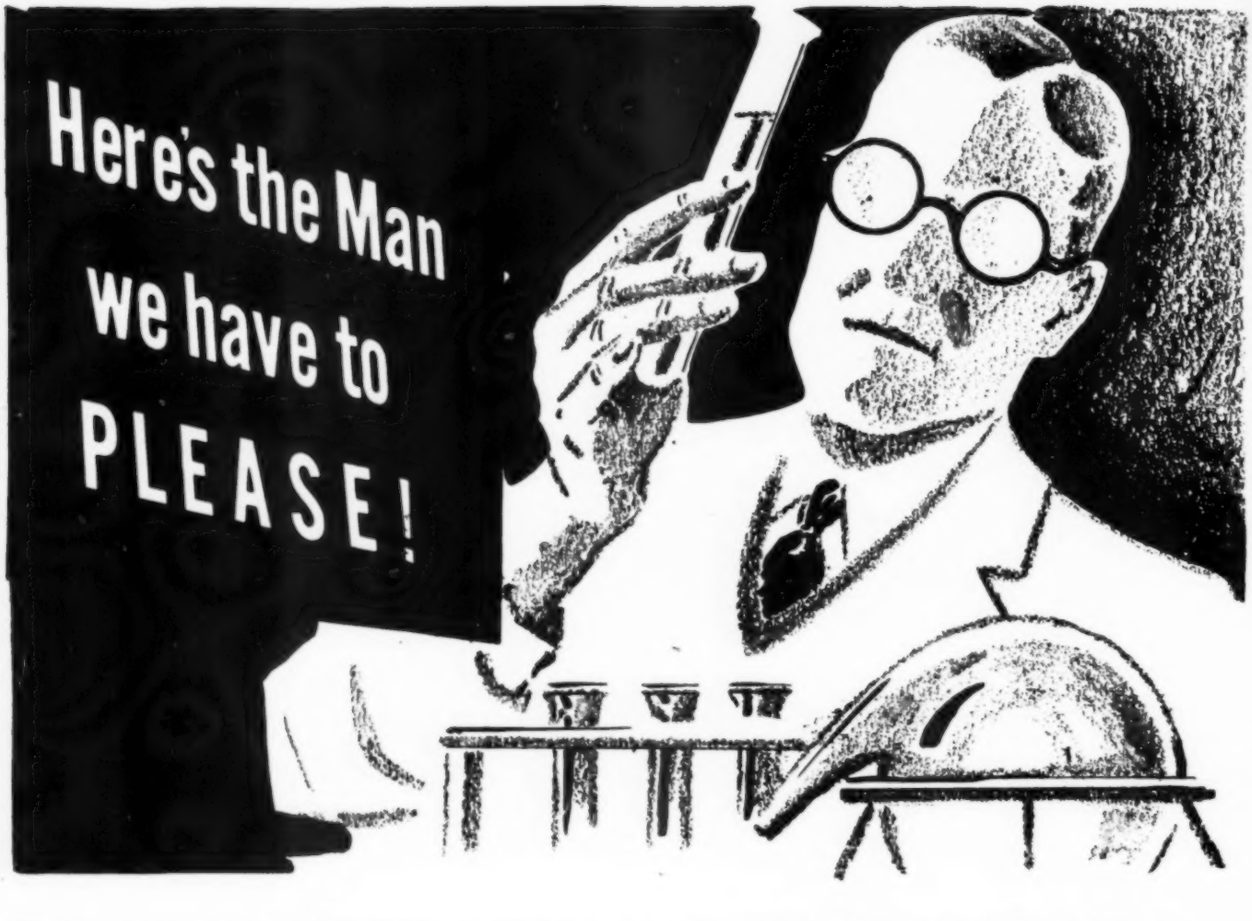
Your inquiries are invited. Please address them to the New York office of

PITTSBURGH AGRICULTURAL CHEMICAL COMPANY
Empire State Building · 350 Fifth Avenue · New York 1, New York

Affiliated with

PITTSBURGH COKE & CHEMICAL COMPANY
Grant Building · Pittsburgh 19, Pa.

COAL CHEMICALS · ACTIVATED CARBON · NEVILLE COKE · EMERALD COAL · PIG IRON · GREEN BAG CEMENT · CONCRETE PIPE AND CONCRETE PRODUCTS · LIMESTONE PRODUCTS



Most customers are tough to please . . . but the toughest is the trained technician who's looking for loopholes in your insecticide, rodenticide, fungicide or weed killer. Please him—and you're certain of pleasing the ultimate consumer.

Pleasing your trained technicians is a Powco specialty. Powco Brand products are chemically standardized and biologically tested to maintain highest quality—and highest, quickest kill at all times.

Laboratory technicians like the fact that they can rely on Powco products. Their uniformity is guaranteed, so that no changes in end-formulations need ever be made. For this reason, more and more manufacturers choose Powco products.

Another Powco specialty is service. Powco technical knowledge and experimental facilities are there to serve you and your technicians. Investigate today.

Products: Antu, Pyrin #20, Pyrin R, Pyrin D-20, JP #10, JP #25, JP #30, JP #50, JP #50W, Pyrethrum Powders and Extracts, Stimtox "A", Rotenone Powders, Sabadilla, Aerosol Formulas, 2,4-D, BHC (Benzene Hexachloride), HETP (Hexaethyl Tetraphosphate)

Midwest Shade Tree Conference in Discussion of Pesticide Chemicals

DR. J. C. Carter, plant pathologist of the Illinois Natural History Survey, Urbana, Ill., was elected president of the Midwest Shade Tree Conference at the group's meeting held at the La Salle Hotel, Chicago, February 19 and 20. Other officers named were Noel B. Wysong, chief forester, Cook County Forest Preserves, Chicago, vice-president; Alfred F. Carlstrom, general foreman of plantations, Chicago Park District, secretary-treasurer.

The two day meeting attracted nearly 300 persons from a dozen states. Commercial arboriculturists, city and state authorities responsible for supervision and maintenance of parks and forests, agricultural college scientists, civic organizations and other agencies as well as individuals interested in the welfare of shade trees, were represented at the gathering.

In addition to the subject of insecticides, which assumed the most prominence in the discussions, other topics included weed control, mosquito abatement, the effect of sewers, gas mains, drainage pipes and sulfur dioxide on trees.

A timely word of caution was injected into the discussions by Dr. George C. Decker, Illinois State Natural History Survey, Urbana, Ill. Dr. Decker commented on the "chaos and confusion" which has marked introduction of a dozen or more new insecticidal compounds in the past four years. "Whether they represent progress remains to be determined," he asserted. DDT is the oldest of the new insecticides and, although it has been studied and tested throughout the world and used extensively by military and public health services and others, very little is yet known about its proper use.

"The normal gestation period of a new insecticide," Dr. Decker declared, "should be from three to five years. We're making a mistake to bring it prematurely before the public."

DDT, he said, shows promise of killing more flies, mosquitoes, household pests, fruit insects and others than any insecticide of long standing. But he insisted that "it is not a cure-all."

Properties and uses of "DDD," BHC, chlordane and "Toxaphene," pointed out their advantages and disadvantages over DDT and as to BHC he added that "we may be dealing with a premature birth."

Remarking that the new organic phosphates are very toxic to many insects in concentrated form, he made it plain that such toxicants should be used with extreme care."

The new federal insecticide law, Dr. Decker asserted, can now give purchasers some confidence in what they buy. The labeling and literature requirements of this statute, he said, eliminate claims that cannot be substantiated and should greatly aid in driving "crooks and shysters" out of the insecticide business.

Dr. L. L. English, also with the Illinois State Natural History Survey, in his paper on "Recent Advances in Insecticides," paid tribute to the development of the high pressure sprayer and the hurricane type blower. Use of DDT, Dr. English continued, offers many advantages for control of forest and shade tree insects. It can be formulated in various forms and in almost any desired concentration. When used on shade trees its long lasting residual effect need not cause worry and there is little danger that it will upset the balance of nature.

In some detail Dr. English outlined the place of DDT and other new insecticides on leaf feeding insects, scale insects, borers and other enemies of shade trees. DDT, as a dust or spray can be used effectively against the adult Japanese beetle, now well established in the middle west, he said, but chlordane is even more effective than DDT for control of this beetle in the larval stage.

Control of oak wilt, a fungus disease which is ravaging oak trees throughout Wisconsin and to some extent in Minnesota, Iowa, Missouri and Illinois, may be a problem for entomologists, according to Dr. A. J. Riker, plant pathologist, Univ. of Wisconsin. After years of study, the correct nature of this blight had been established by Dr. Riker and his associate workers. He admitted, however, that "We don't know yet how to control it, because we don't know how it is spread."

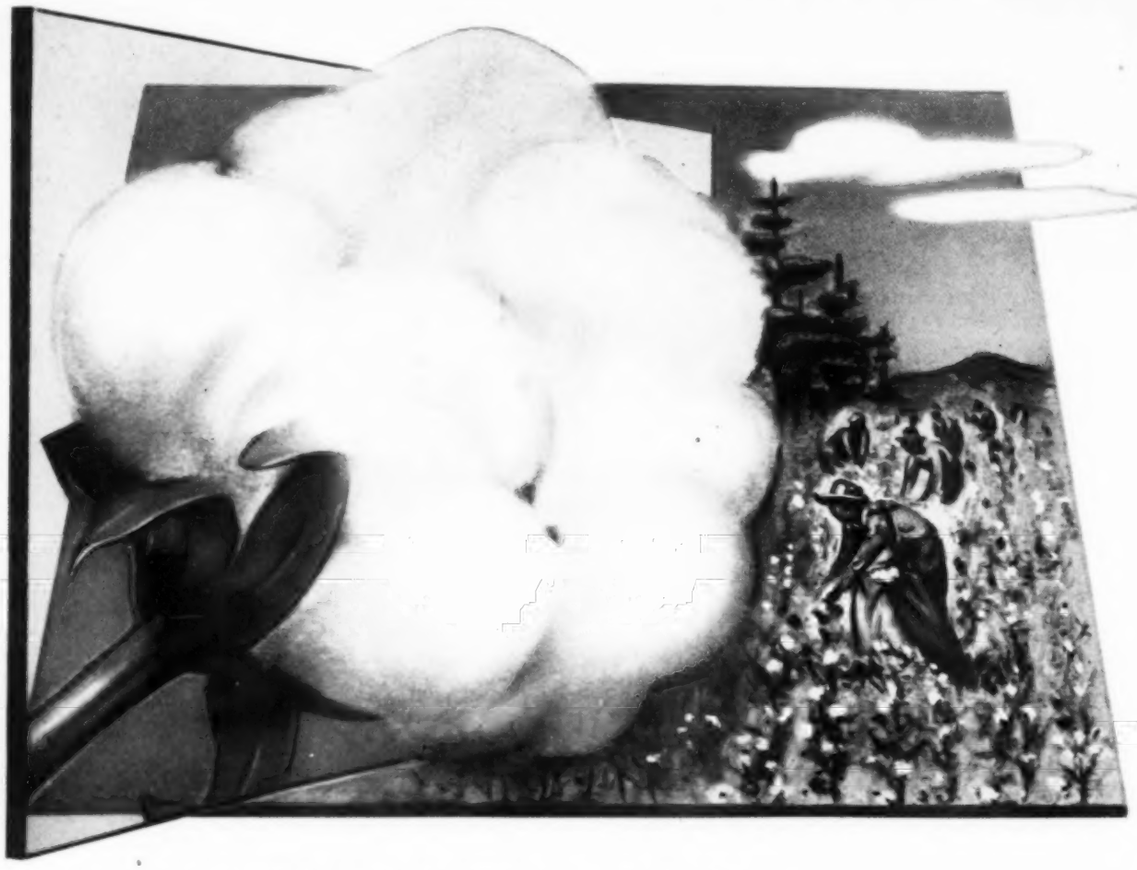
Squirrels and woodpeckers may be carrying the disease from tree, to tree, he said, but it is possible, also, that June bugs or other insects may transmit the virus, picked up as their wings beat on infected leaves. "If this is true," he said, "it may be a matter of developing chemical controls for the insect carriers. We hope that the entomologists can help here."

Mist spraying for control of mosquitoes and flies produced the best results when done after sunset in the Des Plaines Valley Mosquito Abatement District, J. Lyell Clarke, sanitary engineer in charge of the work reported. Fog spraying done by day in suburban areas west of Chicago had given unsatisfactory results, he said. Then, one time a "smoker" was used after sunset and it was noticed that the mist, instead of rising, rolled along close to the ground. A greater kill also resulted, as shown by the count in the control traps.

This, it was deduced, was due to the longer contact the mist had with the infested ground areas, along with the higher humidity and lower temperature of the evening hours. Now, two sprays a year accomplish what formerly required ten or twelve, he said. And the kill is 95 percent. Mist spraying at night, Mr. Clarke suggested might also prove effective for control of tree and crop insects.

Discussing "Sulfur Dioxide Injury to Vegetation," E. R. Spencer, consulting botanist and plant patho-

(*Turn to Page* 74)



FOR BETTER INSECT CONTROL—

Build your COTTON INSECTICIDES around Baker's BHC!

Results with BHC (Benzene Hexachloride) have been outstanding in the control of the boll weevil, cotton aphid, cotton leafworm, and cotton fleahopper—all the important cotton insects, except the boll worm and red spider.

Since DDT is effective for use against the bollworm, a mixture of DDT and BHC makes an excellent all-purpose dust for cotton. A combination of 5 per cent DDT and 2.88 per cent gamma isomer BHC has given yields of 1,171 pounds of cotton—compared with 917 pounds for calcium arsenate and 310 pounds for no treatment. As an all-purpose cotton dust a mixture containing 3 per cent gamma isomer BHC, 5 per cent DDT and 40 per cent sulfur has also been reported recently to be especially effective.

Where aphids are prevalent, BHC is especially valuable, since aphids are not economically controlled by other insecticides.

If you are in a position to formulate insecticides and distribute them in the Cotton Belt—Baker's BHC offers you an excellent opportunity to create sales.

Baker's BHC Technical contains a guaranteed minimum of 12 per cent gamma isomer as determined by infra-red assay. It is ready to be formulated into dusts, pastes, wettable powders, liquid concentrates and emulsifiable solutions.

Baker's BHC is available in 25, 50, 100 and 200 pound containers, up to carload lots. Test samples available to formulators. Write today for free bulletin and prices. Address *Agricultural Chemical Division,* J. T. Baker Chemical Co., 66 South Main St., Phillipsburg, N. J.

Baker's Agricultural Chemicals Sales Leaders: **DDT • 2,4-D FORMULATIONS • BHC • ANTU**

Baker's Agricultural Chemicals

Northeastern Conference Discusses

Chemical Weed Control

THE latest developments in chemical weed control methods were discussed in detail at the Northeastern Weed Control Conference held February 12 and 13 at the Commodore Hotel, New York. The group reelected its officers at the business session on Friday, which leaves as chairman Dr. G. H. Ahlgren, Rutgers University, New Brunswick, N. J.; vice-chairman, Dr. B. H. Grigsby, Michigan State College, E. Lansing; and secretary-treasurer, Dr. R. D. Sweet, Cornell University, Ithaca, N. Y. More than 300 persons were in attendance at the sessions.

C. Chester DuMond, New York State Commissioner of Agriculture told the group at a luncheon meeting that the necessity for greater production of food has reached the point where something must be done about weeds. He remarked that "at long last, chemistry has come to the aid of those who fight weeds," and told his audience that the time is "right and opportune" to carry to the grower complete information about chemical weed killers.

The New York commissioner warned industry about moving too fast, however, lest the new herbicides be wrongly employed and arbitrarily condemned by the consumer. He recommended working through state extension services and through county agents who have the confidence of growers in their respective areas. Private industry was commended for providing the incentive to promote the use of new chemicals and other methods on farms. These in turn make more profit for the farmer upon whose prosperity the future of the agricultural chemical industry depends.

On the technical side, Dr. L. W. Kephart, Bureau of Plant Industry, U.S.D.A., presented an over-all picture of new weed control developments in the United States.

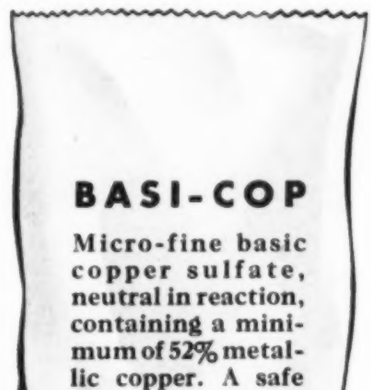
He told of some of the developments during the past year, and stated that within that period, more new herbicides have come into use, or more new uses of old herbicides have been discovered, than in any similar period within memory. Among the new preparations mentioned by Dr. Kephart were a number of comparatively recent advent, including "TCA," "Aero Cyanate," pentachlorophenol and sodium pentachlorophenate, and a combination of pentachlorophenol, 2,4-D and aromatic oil. Paradichloro benzene, usually thought of as a control for peach tree borer, has been found useful for weed control in cranberries, he said, and promising tests have been made with high-aromatic petroleum oils in the high-boiling range. The marketing of sodium isopropyl xanthate and chlorophenyl carbonate has begun, Dr. Kephart stated, and this material was noted as being "very interesting from the standpoint of composition."

"This year," he said, "Recognition was given again to one of the original growth-regulator substances, 2,4-5 dichlorophenoxy acetic acid. It seems to have some properties that 2,4-D does not possess." He also mentioned work on nutgrass control in Mississippi with ethylene dibromide, and told of an Oklahoma development in weed control prepared from a common antifreeze solution. The final item on his list of new herbicidal developments was 3-acetyl-6-methoxy-benzaldehyde, or "AMB," an exudate of the California brittle bush which produces its own "herbicide" to protect itself from the encroachments of other plants.

Dr. Kephart stated that nearly 90 percent of the weed control research projects now under way or being planned by the U.S.D.A. and State agricultural experiment stations are concerned directly or indirectly with herbicides. "The research on weed control being conducted by commercial companies is probably even more heavily weighted on the side

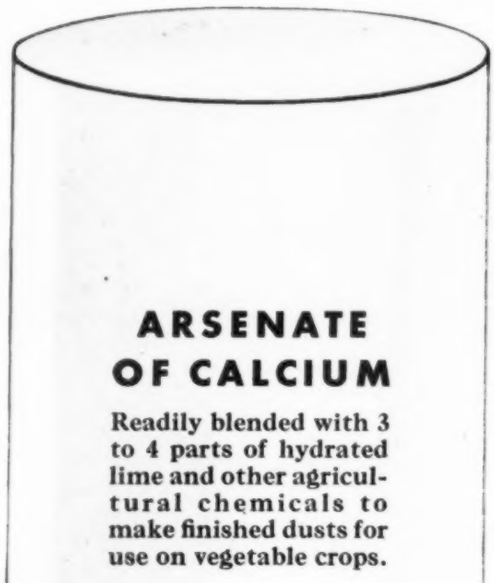
Photo above: General view of N. E. Weed Conference at luncheon first day of meeting, Hotel Commodore, N. Y.

Top-quality concentrates for dust manufacturers



BASI-COP

Micro-fine basic copper sulfate, neutral in reaction, containing a minimum of 52% metallic copper. A safe fungicide for trees, vegetables and other foliage. May be blended with insecticides to make all-purpose dusts.



ARSENATE OF CALCIUM

Readily blended with 3 to 4 parts of hydrated lime and other agricultural chemicals to make finished dusts for use on vegetable crops.

OTHER *SHERWIN-WILLIAMS* CONCENTRATES

DDTOL 50% DUST. Readily blended with diluents to make free-flowing 3% or 5% DDT dusts. (DDTOL VINE-SAFE 50% WETTABLE also available, containing 50% specially refined DDT.)

ARSENATE OF LEAD. For blending to make 10% to 20% dusts.

CHLORPHEEN 40% DUST. Contains 40% by weight of Chlorinated Camphene. Readily blended with diluents (except highly alkaline ones) to make free-flowing dusts for control of grasshoppers and cotton and tobacco insects.

ZINC SULFATE 36%. Spray-dried material for use in products for correcting nutritional deficiencies; "safener" for Arsenate of Lead.

B. C. A. (Basic Copper Arsenate). Total arsenic (expressed as metallic) not less than 24.2%. Copper (expressed as metallic) not less than 41%.

ISO-HEX 5% GAMMA DUST. Contains 5% of the gamma isomer of Benzene Hexachloride. For blending with diluents to make dusts for control of cotton and truck crop insects.

BLACK LEAF 40. For control of aphids and similar sucking insects.

PARIS GREEN. For the manufacture of poison baits for cutworms and of dusts for shade tobacco.

HALODANE 40% WETTABLE. For blending with any diluent (except highly alkaline ones) to make 3% or 5% Chlordan dusts.

In dust concentrates, just as in paints, the Sherwin-Williams name stands for one unvarying quality—*the best!* Start with S-W concentrates for dusts that mean satisfied customers. For detailed information, write to The Sherwin-Williams Co., Agricultural Chemicals Division, Room 1261, Midland Building, Cleveland 1, Ohio.

SHERWIN-WILLIAMS

AGRICULTURAL CHEMICALS

Officers Re-elected by Delegates to Northeastern Weed Control Conference

Dr. G. H. Ahlgren
Re-elected Chairman

Dr. B. H. Grigsby
Continues as Vice-Chairman

Dr. R. D. Sweet
Remains Secretary-Treasurer

of chemical weed killers," he said.

Discussing means of controlling weeds on farms, he said that "the intelligent way to control weeds is not to have any weeds to control. The reason that weed control is such a vicious problem is due primarily to the fact that practically all soils that have been under cultivation for any length of time contain uncountable billions of viable weed seeds. Most of these seeds remain dormant in the soil unless they are brought within half an inch or less of the surface. They form an almost ineradicable reservoir of trouble, for every-time the soil is stirred, a new crop of weed seedlings appears." He pointed out that the labor involved in eliminating this condition by turning the soil is beyond all practical limits, but that judicious cropping coupled with the use of chemicals could help greatly in reducing the weed menace. He cited a number of examples where unproductive farms were rejuvenated to become prosperous through these means.

Dr. John W. Mitchell, also of the U.S.D.A. Bureau of Plant Industry, described the physiological effects of 2,4-D on plants, and factors affecting the inactivation of 2,4-D in soil. He reported results of experiments in which 2,4-D was applied to various parts of plants, and the effects of temperature and moisture on the inactivation of 2,4-D in soil. Dr. Mitchell's complete paper is presented elsewhere in this issue of *Agricultural Chemicals*.

Dr. O. C. French, Cornell University, presented a paper in which some of the latest methods of herbicide application were described. He stated that no one had "all the answers" to every problem in the application of 2,4-D and other weed killing chemical preparations, but at the same time definite progress has been made within the past year.

His talk covered application by ground spraying equipment, by pumps and sprayers, lawn and golf course applicators, and by aircraft. Manufacturers of such equipment, he said, are somewhat confused about what is desired, since from different parts of the country come varying recommendations. The recent practice of low volume applications of 2,4-D has thrown additional confusion into the picture, but some of the fundamentals remain unchanged.

The requirements of spraying are relatively simple; that is, to distribute the material over the desired area and plant surface, and to produce a spray with sufficient momentum so it will overcome wind resistance and will not drift materially. Another object is to accomplish this with a minimum expenditure of material.

Pressures of from 30 to 75 psi with proper nozzles are most desirable to prevent drifting of atomized spray droplets, he said. However, for the application of contact herbicides such as fortified oils for killing all vegetation, pressures of from 100 to 150 psi are needed to assure adequate wetting of plants. Details of booms and nozzles were described, with the recommendation that brass pipes should be used to eliminate scaling and clogging. If the volume is less than 5 gallons per acre, cone-spray nozzles work better than fan-type, he said; but for high volume spraying (25-up), 80° fan nozzles spaced 15 inches apart should be used. Another hint to reduce clogging is the use of as large a nozzle as possible under reduced pressure, Dr. French stated. He suggested further that the boom should be mounted ahead of the propelling unit in view of the operator, if possible.

The pumps themselves were discussed by Dr. French who stated that high pressure ones are unnecessary under most conditions of herbicide application. For small units, with 12 or 15 feet of boom, perhaps the most desirable pump selection would be the bronze gear variety, although these wear rather quickly if abrasive materials are handled. If clean water or oils are used entirely, the wear will not be excessive, he said.

In using concentrated spray materials, a number of precautions are to be observed in application.

New

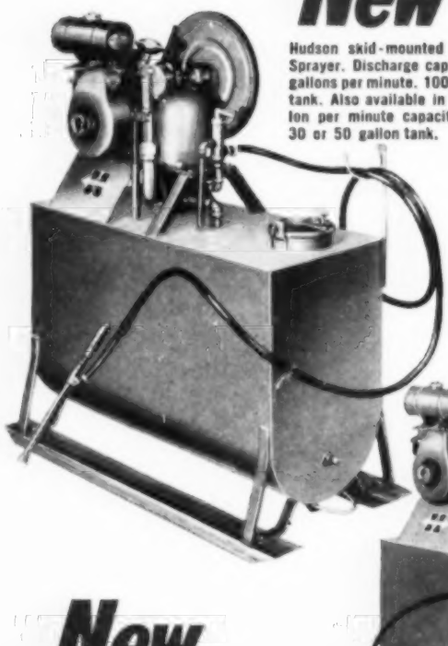
Improved

New

Hudson pneumatic tire Power Sprayer with trailer hitch. Discharge capacity 4 gallons per minute. 100 gallon tank.

HUDSON POWER SPRAYERS

New



Hudson skid-mounted Power Sprayer. Discharge capacity 4 gallons per minute. 100 gallon tank. Also available in 2 gallon per minute capacity with 30 or 50 gallon tank.

- **NEW Spraying Efficiency**
- **NEW Dependability of Performance**
- **NEW Ease of Handling**

You're looking at the most advanced line of power sprayers ever made. They're completely new . . . with many valuable improvements you want and need . . . and now can have.

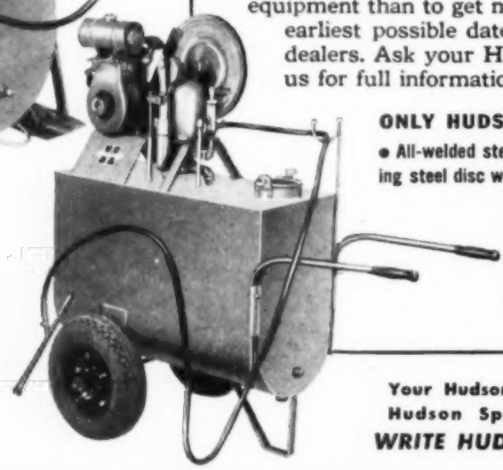
These new Hudson Power Sprayers will apply your spray materials more efficiently than was ever before possible. Improved pumps, new agitators, new nozzles and other important features will save time and work, make spraying easier, assure trouble-free continuous operation.

You could make no better investment in labor-saving equipment than to get new Hudson Power Sprayers at the earliest possible date. Hudson is now supplying their dealers. Ask your Hudson dealer about them. Or write us for full information.

ONLY HUDSON OFFERS ALL THESE FEATURES

• All-welded steel tanks • Full pneumatic tires on roller bearing steel disc wheels • Rugged, all-welded chassis • Highly efficient gasoline engine • Heavy duty pump • Full controllable pressure • Stainless steel valve assemblage • Slow speed long life pumps • Constant, positive, liquid agitation • Perfect balance assures ease of movement

New



Hudson pneumatic tire Power Sprayer. Discharge capacity 2 gallons per minute. Available with 30 or 50 gallon tank.

Your Hudson dealer has or can get your New Hudson Sprayer promptly. See him today.

WRITE HUDSON FOR FULL INFORMATION.

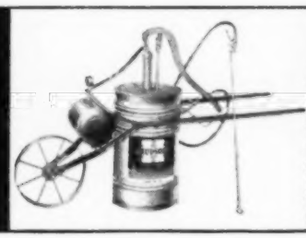
H. D. HUDSON MANUFACTURING COMPANY • 589 E. Illinois Street, Chicago, Illinois, U. S. A.

Sprayers and Dusters
Hay Tools and Barn Equipment
Livestock Equipment

HUDSON

Poultry Equipment
Farm Ventilation Equipment

TESTED AND PROVED EQUIPMENT



New

Hudson "Porta-Spray." 15 gallon capacity. With or without pressure tank. Steel, semi-pneumatic or full pneumtic wheels.

Adequate screening or filtering of the material ahead of the nozzles is necessary, particularly in the case of the tiny nozzles used when spray is applied at less than 5 gallons per acre at speeds under 6 miles per hour. These unusually small nozzles clog easily. Another precaution lies in preventing drip from the nozzles which can result in burning or sterilization of the soil if a considerable amount of concentrated material is deposited in a small area under a nozzle. A close calibration of ground speed and rate of delivery was urged by Dr. French. "A small change in ground speed will greatly affect the rate of application," he said.

Airplane spraying is satisfactory, particularly when operators are careful to adjust their nozzles and pressure to produce as large a droplet size as possible, and still maintain distribution. 2,4-D dusts have not been applied to any extent, except on brush lands for clearing purposes. Most of the planes in California, where Dr. French has had experience with this type of application, are equipped with booms and nozzles extending from wing tip to wing tip. These have positive valve-shutoffs directly in front of each nozzle. Power take-offs are used in some cases, but often the pump was operated with auxiliary propellers.

E. A. Walker, U. S. Department of Agriculture, Fungicide and Herbicide section of the P. & M. A., was to discuss regulatory developments, but was unable to attend the meeting. Dr. Kephart discussed the subject in connection with his own talk of the morning.

At the luncheon following, W. H. Allen, New Jersey State Secretary of Agriculture told the group that economic production in agriculture is the watchword from now on. The rule must be "produce or get out" he said. He warned industry against putting faulty products on the market, lest they "backfire" wih bad results for the manufacturer. More and more research is needed, the Secretary stated, with emphasis on cutting down on the chores of farming, and increasing the over-all production.

The part played by petroleum products in herbicides was related by H. L. Yowell, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J. Dr. J. R. Havis, Cornell University, discussed the herbicidal properties of certain pure hydrocarbons. He told of experiments made with 31 pure hydrocarbons of aromatic, olefin, and paraffin series. These were rated generally in that order as to toxicity, and according to tests, the boiling points of each seemed to influence the toxicity. In general, the hydrocarbons with a boiling range from about 150 to 275° C. were more toxic than hydrocarbons which boil on either side of that range, he said.

Composite photo of speakers' table at Friday's luncheon. Left to right: Dr. L. W. Kephart, Dr. C. J. Willard; Dr. R. D. Sweet; C. Chester duMond; Dr. G. H. Ahlgren, Alfred H. Fletcher, official representative of the City of New York; Prof. W. C. Muenscher; Dr. B. H. Grigsby; Dr. K. S. Quisenberry; and Dr. Benjamin Wolf.

Concurrent Sessions

FRIDAY morning's activities consisted of four concurrent sessions, each covering a different phase of weed control. One session covering vegetables and potatoes, was under the chairmanship of Dr. B. H. Grigsby, Michigan State College, E. Lansing, Mich.; another was on field crops, pastures and turf, under the chairmanship of Dr. E. Van Alstine, Cornell University; a third on fruit, nursery and ornamentals, under Dr. A. E. Prince, Maine Agricultural Experiment Station, Orono, Me.; and fourth, public health and welfare under the chairmanship of C. B. Link, Brooklyn Botanic Garden, Brooklyn, N. Y.

Discussing the question, "Why control weeds in field peas," Dell Fink, American Cyanamid Co., pointed out that for the grower, weed-free peas mean less labor per ton in vine loading, and savings in time in hauling from field to viner. With weeds controlled there are also fewer delays in bringing in the crop, which obviates machinery and employees standing idle while the crop is coming in. The same time-saving factors are true for the processor, with the added advantage of having higher grade peas, and escaping losses caused from weeds being ground with the peas and imparting undesirable flavors to the product. Mr. Fink stated that much more research is necessary, but that the advantages of chemical weed control for any crop are numerous.

Weed control experiments at Seabrook Farms, Bridgeton, N. J.,

2,4-D

AVAILABLE under your own private brand name or our Stantox 2,4-D label

With 12 year's experience in the manufacture and field use of *selective* weed killers, we are now in a position to offer Agricultural Chemical Distributors or Processors a complete line of 2,4-D Weed Killers. All of our products have been thoroughly tested in practical field tests by our trained technicians and have been approved by all leading agricultural authorities.

STANTOX "70"

Dry 2,4-D (Sodium Salt)—In 1947, grain farmers all over the country reported excellent results in the control of annual weeds with Stantox 2,4-D dusts and sprays. With more and better spraying and dusting equipment now available, this market is bound to increase many times over.

STANTOX "66"

2,4-D (Liquid Amine Salt)— This liquid 2,4-D concentrate is very popular because it can be used in low volume spraying. Its complete water solubility makes it an easy, economical spray for selected killing of broad-leaved annual weeds in certain crops and lawns. Thousands of acres of small grains, rice and corn were commercially sprayed by ground rig and plane using a volume of 5 to 10 gals. of Stantox "66" 2,4-D spray per acre.

STANTOX "P-44"

2,4-D (Isopropyl ester of 2,4-D)—To round out the Stantox 2,4-D line we offer Stantox "P-44" for "hard-to-kill" woody perennials and mature weeds. Here again, the action is "selective", as Standox "P-44" clears weeds from pastures, irrigation ditches, roadsides, etc., without affecting the desired grasses. It also can be used for low-volume spraying on corn, rice and small grains.

2,4-D
ACID
SODIUM SALT
ISOPROPYL ESTER
TRIETHANOLAMINE SALT

were described by Dr. D. M. Parmelee of Seabrook Farms. After extensive experiments throughout 1947, three herbicides were considered ready for limited commercial application. These are calcium cyanamid, Stoddard solvents, and "HB," a Standard Oil Co. product. Dr. Parmelee noted that the latter material should be used with caution until the experimental data is more conclusive. He stated that for selective weeding of asparagus and possibly peas, calcium cyanamid will be used although it may not be as effective as 2,4-D. It has the advantage of being safe for airplane spraying, and is of value as a nitrogenous fertilizer.

Both Stoddard solvent and "HB" emulsions will be used in 1948 for pre-emergence work at Seabrook, he said. "HB" is less expensive and more potent than Stoddard solvent, but the residual effect of the former tends to limit its use. Under normal conditions, he said, applications of "HB" would be made two days after planting, allowing about three days for the material to evaporate before the crop emerges. However, if weather or other factors delay the application until a day or so before the crop is expected to emerge, Stoddard solvent may yet be applied without residual risk. No change is anticipated from the established practice of using Stoddard solvent as a selective spray for carrots or other members of the umbellifera family, Dr. Parmelee stated.

"Chemical Weed Control in Onions" was discussed in a paper by W. A. Hedlin, Cornell University. He stated that after many experiments, it was found that cyanamid should not be applied at rates more than 60-70 pounds per acre as a pre- or post-emergence treatment. The lower limit may be less than 60 pounds. If the material is to be used to kill weeds after they are up, the foliage must be wet at the time of application. These experiments indicate that "KOCN," available commercially as "Aero-Cyanate," can be used as a selective weedicide in onions if low concentrations are used while the onions are small and applications are made before the weeds have grown too large. When "KOCN" is used as a spray, the foliage must be dry for optimum results, Dr. Hedlin reported.

Reports on pre-emergence chemical weeding of potatoes on Long Island were presented by Walter C. Jacob, Cornell University. He told of using five materials in the experiments, including sodium salt of 2,4-D at 5 and 10 pounds per acre; "Sinox General" at 2 pints and 3 pints, plus 4 gallons and 6 gallons of kerosene, respectively; "Dowspray 66 Improved" at 2 and 3 gallons per acre; methyl ester of naphthalene acetic acid at 4 and 8 pounds per acre; and "Aero Cyanamid" dusting grade, at 50 and 100 pounds per acre.

The major portion of weeds present were smart weed, lambs quarters and pig weed. Crabgrass was also present, but had not matured at the time of the experiment, he stated. Results showed that both of the hormone maerials gave some conrol at the second date of application, June 19, (the earlier date was June 4) with the heavier concentrations being more effective. This date was still too early for any effective action by the dinitros or cyanamid. Most of the materials applied at the time of emergence gave significant weed control, he reported. The slower action of 2,4-D was illustrated by the increase in weed control on June 19, as compared to June 4. With the other materials, a few weeds were showing on June 19 which had not been visible on June 4.

Observations were made also on the effect of herbicides on the growth of potato tops. It was noted that 2,4-D was the only material which reduced top growth seriously from earlier application. The dinitros caused temporary injury, while the 2,4-D injury became worse and delayed the maturity of the plants at least two weeks. It was evident that lower concentrations of 2,4-D must be used to prevent injury to the potato plants.

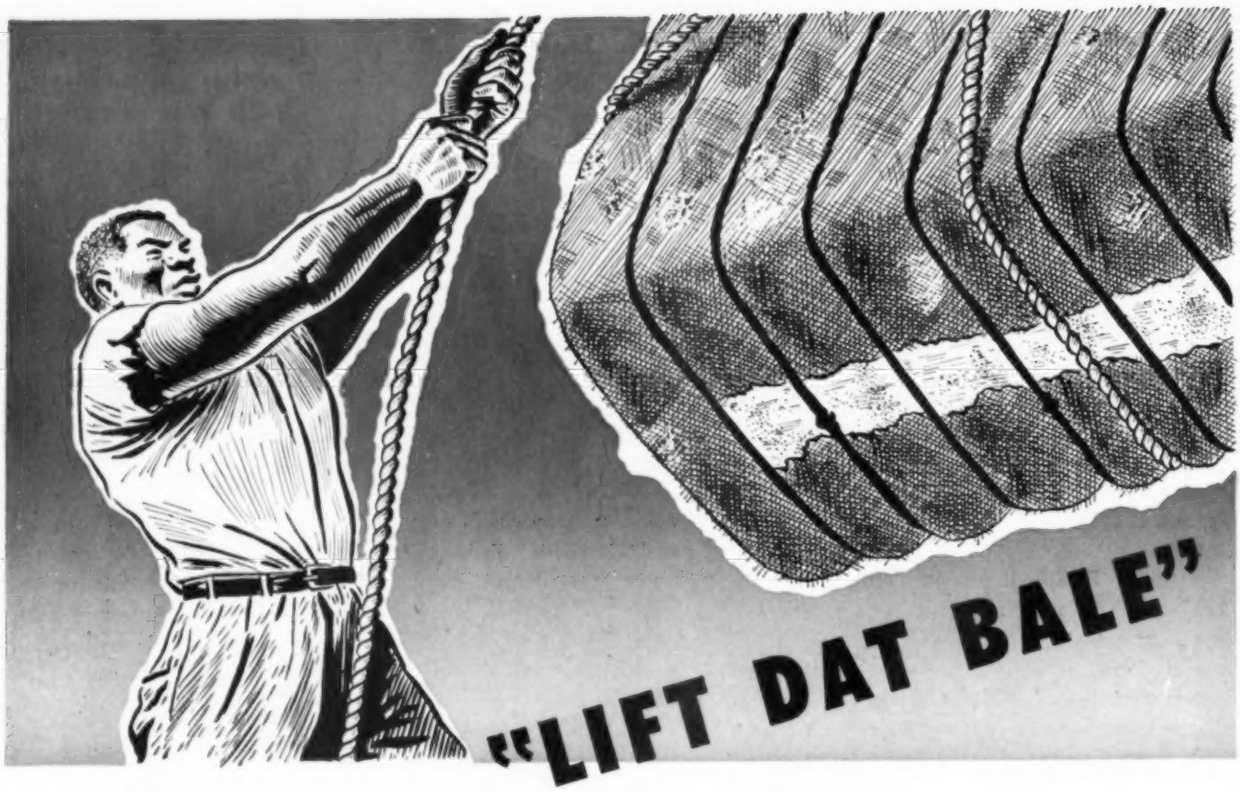
Regarding the yield of potatoes treated with these herbicides, Dr. Jacob stated that judging from the results, the hormone sprays and cyanamid were all satisfactory treatments for weed control purposes.

A paper on weeding sweet corn with 2,4-D was presented by Dr. C. H. Dearborn, Geneva, N. Y., R. D. Sweet and J. R. Havis, Cornell University. The paper reported that the yield of sweet corn treated at ten different stages of growth approximately a week apart, was not adversely affected by applications of 2,4-D at rates of 0.4, 0.6 and 0.8 pounds per acre. Experimental blocks treated at these rates on July 14 and July 21 produced significantly more corn to the acre in the husk than did uncultivated check plots in the same area. Satisfactory control was obtained on lamb's quarter, red-root and ragweed, although at harvest time there were a few young seedlings of these weeds in the block which was treated earliest.

Varietal response to foliage sprays of 1 pound of 2,4-D per acre were studied. Of the eight varieties studied, the growth of Seneca Dawn and North Star showed the most 2,4-D symptoms, whereas Lincoln and Loana showed the least. Both greenhouse and field tests indicated that rainfall might influence the toxicity of 2,4-D to sweet corn when applied as a pre-emergence treatment.

The final paper on the vegetables and potato program was presented by Dr. Sweet and Dr. Havis of Cornell University. They reported tests with five petroleum products, two growth regulators, and one dinitro, in treatments consisting of "pre-emergence" sprays on the direct-seeded crops; (radishes, beets and spinach) and "post-setting" sprays on the transplanted crops: tomatoes, cabbage and broccoli.

When weeds had already germinated, excellent control was obtained with several petroleums having a boiling range below 650° F., but not with heavier fractions. Dinitro ortho secondary butyl phenol in oil also gave good control. Under these conditions, time of application had but little influence on weed kill, but timing had a pronounced effect on the toxicity to the crops. Applications made immediately after plant-



higher into your profit column with this complete Penco* cotton program

*REG. U. S. PAT. OFF.

The Boll Weevil alone destroyed more than $319,000,000 worth of cotton in 1946. Most cotton growers in the Cotton South felt some of this loss.

By using these Penco Cotton Insecticide Concentrates, *you* can help cotton planters and, at the same time, help yourself toward bigger insecticide profits. These Penco Insecticides are the result of up-to-the-minute research—both in the field and at Pennsalt's Whitemarsh Research Laboratories. They are made by Pennsalt—a leading *basic* producer of agricultural chemicals . . . and are designed to do a specific job and do it well.

PENCO CALCIUM ARSENATE—Produced in the South for use in the South to control boll weevil, bollworm and leafworms. Use as is or in mixed dusts with sulfur, etc.

PENCO BHC & DUST BASE D-12—contains 12% gamma isomer of benzene hexachloride . . . used in preparing finished BHC dusts for control of boll weevil, cotton aphids, leaf hoppers. A micron-sized high gamma concentrate ready for simple blending.

PENCO DB-50 (Dust Base)—contains 50% DDT for use by compounders in preparing finished DDT dusts for use on cotton. Can be combined with Penco BHC D-12 and sulfur for formulation of combination dusts such as BHC-DDT-Sulfur 3-5-40.

PENPHENE (Chlorinated Camphene)—Penphene D-40 is especially suited for dust mixers making lower concentrations for use on cotton. Controls boll weevil, bollworm and certain other cotton insects.

For full details about these and other Penco products, write to Agricultural Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa. • Bryan, Texas • Tacoma, Wash.

PENN SALT

AGRICULTURAL CHEMICALS

ing were more toxic to the vegetables than were those made just prior to crop emergence. The reason for this unexpected behavior was not clear. However rains on the early treatments might have brought the toxicants into contact with the seed. In the later case, it was thought that perhaps the wet soils present at the time of application might have diluted the emulsions, resulting in poorer weed control.

Post-setting treatments show the possibilities of eliminating hand hoeing of widely spaced transplanted crops by the use of contact herbicides, the paper said. The methyl ester of naphthalene acetic acid and 2,4-D were not satisfactory for this purpose.

Pastures & Turf Session

UNDER the chairmanship of Dr. Van Alstine, Cornell, some five papers were presented. Dr. H. B. Musser, Pennsylvania State College, State College, Pa., spoke on a "Study of Dryland Spray Treatment of 2,4-D Formulations on Established Turf." The selective properties of the herbicide were brought out in the discussion.

In the second paper of the session, J. A. DeFrance, Rhode Island State College, Kingston, R. I., presented a discussion of crabgrass control in turf. He stated that certain formulations of phenyl mercury complexes are definitely satisfactory for control of crabgrass. 100 percent control of crabgrass on lawns composed of Kentucky bluegrass, Chewing's fescue and Colonial bent can be obtained without injury to the permanent turf grasses. Applications of PMAS or PMAS-AA at the rates of 1:4,000 or 1:5,000 used three times at weekly intervals gave 100 percent control.

Mr. DeFrance reported that complete control of all weeds, including common and fall dandelion, narrow and broad plantain, chickweed and crabgrass with no permanent injury to the turf was obtained by three treatments at weekly intervals in August with a mixture of PMAS at 1:6,000 and 2,4-D butyl ester at 1:4,000, applied at the rate of 10 gallons to 1,000 square feet. The experiments indicated that dormant hard seed is very difficult to kill, Dr. DeFrance said, and it is doubtful that crabgrass seed, except when maturing or germinating, can be killed with solutions which do not harm lawn grasses. The best time for treatment with a minimum number of applications appeared to be in July or August after seeds had germinated or were in the process of germinating.

"Pre-emergence Weed Control in Corn" was discussed in a paper by S. M. Raleigh and R. E. Patterson, Pennsylvania State College; and Dale E. Wolf, Rutgers University, New Brunswick, N. J., told of experiments in "Pre-emergence Control of Weeds in Corn with Cyanamid."

John C. Anderson, also of New Jersey Agricultural Experiment Station, discussed pre-emergence spraying with 2,4-D to control weeds in corn. He reported that applications of 1½ pounds of 2,4-D per acre eight days after planting, gave corn grain yields equal to those of the cultivated check plots. Average yield of all plots treated on the day of planting was significantly less than for those treated eight days afterward. The experiments were made on 4 kinds of hybrid corn, and there was apparently no significant difference between the respective yields in the weed experiment, he reported.

Fruit, Nursery, Ornamentals

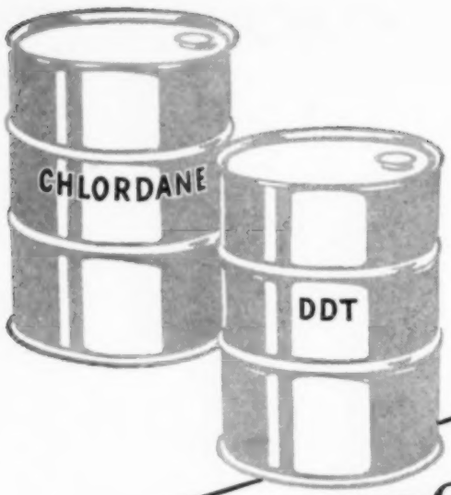
THE session on Fruit, Nursery and Ornamentals, was conducted under the chairmanship of A. E. Prince, Maine Agricultural Experiment Station, Orono. Dr. Prince presented a paper on "Chemical Control of Woody Plants in Blueberries," in which he explained some of the problems involved in this effort. Experiments were made in 1946 and 1947. Early results indicated that unwanted plants such as alders, birch, sweet fern and some willows could be easily killed, while others such as bunch berry, wintergreen and brake fern were controlled little if at all. The 1946 trials indicated that while some 2,4-D formulations caused considerable injury to blueberry plants, other formulations seemed to be less injurious. Application of 2,4-D when the weeds are small, makes for better control with small amounts of material. It also results in less damage to blueberry plants.

Dusts were used because of an inadequate water supply, but it was found that even though the dust was applied when the weeds were wet, the dust drifted when the plants dried, and damaged other plants as far away as fifty feet. The permanence of the injury will not be determined until next season, Dr. Prince said. From their 1946 experience, the experimenters found that notes taken in the fall were not final, since some of the plants listed as dead were found sprouting, and others listed as uninjured were found dead in July, 1947.

Along similar lines was a report on "Response of Woody Ornamentals to 2,4-D," by A. M. S. Pridham, B. B. Stangler and P. B. Kaufman, Cornell University. Their experiments indicate that injury to woody ornamentals from 2,4-D can be minimized or eliminated by spraying during the dormant period. The treatment of soil to eliminate fleshy rooted perennial weeds is a possibility among woody plants, the paper stated, but perennials themselves cannot be weeded safely with 2,4-D as a herbicide. The amount of 2,4-D needed to accomplish these purposes is 5 to 10 pounds per acre.

"Control of Weeds in Strawberries with 2,4-D" was discussed by Frank Gilbert, Rutgers University, New Brunswick, N. J.; and a paper on "Chemical Weed Control in Massachusetts Cranberry Bogs" was presented by C. E. Cross, Cranberry Experiment Station, E. Wareham, Mass.

The final paper at this session was prepared by a group from Cornell University: A. M. S. Pridham, Prof. B. B. Robb, Peter Kaufman, Alfred Grafagma, Fred Gordon, P. J. Ketcham and John Keller, on "Chemical Weed Control in Ornamental Plantings." Three groups of experiments were discussed, covering pre-planting treatments, pre-emergence, and post-emergence treatments.



ATLAS RESEARCH HAS FOUND THE RIGHT EMULSIFIER FOR YOUR TOXICANT CONCENTRATES

Atlas non-ionic emulsifiers are tailored by research to fit the characteristics of the insecticide with which they are to be used. They will make sprays go farther, wet better and penetrate more thoroughly.

By enabling you to fit the right emulsifier to the toxicant-solvent combination, Atlas helps you to be sure that the concentrate is safe on plants, on animals. The right combination of Atlas active emulsifier, plus the right solvent for the insecticide has been known to increase the kill as much as 12 times!

Atlas research has developed emulsifiers that make concentrates emulsifiable in any type of water. Still other Atlas emulsifiers are especially suitable where rusting of cans and consequent deterioration of insecticide is a problem.

Write for trial sample of Atlas active emulsifiers to suit your own needs.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • ***Offices in principal cities*** • ***Cable Address—Atpowco***

Extensive studies were made in the field of application. Conventional high volume spray equipment has serious disadvantages, the paper stated. Among these are drift injury, need for ample water supply, high cost of equipment, and lack of flexibility. Drift is minimized and adequate coverage is assured for efficient weed control through use of low volume sprays applied as small droplets at low pressure (20 pounds per square inch) through nozzles correctly spaced and placed on a boom mounted close to the ground. To eliminate the necessity for use of a pump, a readily portable carbon dioxide cylinder was used as a source of pressure.

Public Health, Welfare

SEVEN papers were presented on topics dealing with the public health aspect of weed control. This session, with C. B. Link, Brooklyn Botanic Garden, chairman, covered many of the problems involved. W. C. Muenscher, Cornell University, discussed a number of unwanted weeds which should receive special attention for control; F. S. Spon, Pacific Coast Borax Co., told of the use of borate material in weed control. Since the material is easily handled, is not inflammable, noncorrosive to metals, and is not considered poisonous, it has found favor as a weed killer in certain applications where other compounds might be hazardous.

R. P. Gorlin, Department of Health, New York City, described the problems involved in planning and organizing a ragweed control program. He based his talk on the campaign being carried on by New York City, in which 2,4-D has been used successfully to reduce the pollen count during hay fever season.

Control of aquatic weeds was discussed by T. F. Hall, T.V.A. Authority, Wilson Dam, Alabama. He told of experiments conducted in this connection with water weeds encountered in the vicinity of Wilson Dam. Along a similar line was a paper by A. Hansen, Rutgers University, New Brunswick, N. J., on "Weed Control in Salt Marshes."

A progress report on the use of 2,4-D for brush control along the rights-of-way of utility companies was discussed by Ralph Kaufman, Asplundh Tree Expert Co., Jenkintown, Pa. He stated that the best results from spraying may be obtained when brush is from 12 to 36 inches in height. Taller brush requires more material and labor, and the dead brush does not decompose as quickly as it does if the plants are smaller when killed.

The final paper in this session was presented by Lawrence Southwick, Dow Chemical Co., Midland, Mich. It covered the control of woody plant growth by chemical weed killers.

The committee in charge of the program was Dr. Benjamin Wolf, Seabrook Farms, Bridgeton, N. J.; C. S. Harris, Shell Oil Co., New York, and the three executive officers reelected at the meeting.★★

1,000 Attend Western Weed Control Conference at Sacramento, Calif.

A TOTAL of nearly 1,000 persons attended the three-day meeting of the tenth annual Western Weed Control Conference held in Sacramento, California, February 2, 3 and 4. State and Federal Government officials, equipment and chemical manufacturers, airplane dusters and sprayers, seed and grain men, botanists, agronomists, weed researchers, representatives of public utilities and others interested in herbicides formed the main portion of those registered, although the second day's meeting, held at University Farm, Davis Calif., attracted additional ranchers and county officials.

The group elected as president, Bruce Thornton, Seed Lab., Colorado A & M, Ft. Collins, Colo. Mr. Thornton succeeds Virgil Freed, Oregon State College, Corvallis, Ore. Other officers named were:: B. I. Cox, Idaho, vice-president; and Walter S. Ball, Sacramento, California, secretary-treasurer.

Thq program included, in addition to papers and discussions on the topic of weed control, a specialized equipment exhibit said to be one of the largest ever displayed in the state.

The Research Committee met before the regular meeting for discussions of problems attending weed research. It was pointed out that from 2 to 5 years' experiments are required to gain significant results and some degree of precision. Seasonal and positional differences and different cropping conditions as well as legitimate errors must be considered, and occasionaly the weed killer itself may be altered. The investigator must be sure all experiments are made with the same material.

Other matters discussed at the pre-meeting committee session included questions such as what information is sought? What is the difference in the effects of esters, salts or amines? Which is better for certain given control problems? Where should it be placed, etc. . . . At least 4 replicas are needed to determine normal variation. Then there are variations with the stages of plant growth, the influence of temperature and humidity, and a possible soil build-up. Four replicas of 4 stages of growth require 16 plots, and while in one year a significant effect may be observed, the next season may show a reversal. The group advised greater caution against poorly established claims.

Screening techniques for sorting out new herbicides, whether general herbicides or materials for use against a particular species, were discussed. The most usual methods are: (1) The effect on growth regulating substance by determining the elongation of root of radish similar seedling

with different amounts of chemicals; (2) The droplet method, wherein the effect of the chemical in oil and in water on one of the primary leaves is determined; similarly, corn seed germination in solution may be used; (3) Use of a tiny complete water plant, with a record of the number out of 20 surviving the treatment; (4) Treatment of soil, after which indicator plants are grown to determine the length of time the chemical persists in the soil; (5) Spray test plants with the chemical emulsified in a non-toxic oil. The weed pest chosen for destruction determines the plants to be used.

From the discussion of the "classification of plant reactions," it was obvious that more information is needed. The roots of any plant can be killed by persistent effort. Johnson grass in 3 or 4 years will succumb to regular treatments of petroleum oil, but that is not recognized as a control measure. Plants react in many different ways, each having its own curve. There are similarities between plants, but no two are identical. Broad designations such as "hypersensitive," "intermediately sensitive," and "negative" are convenient general terms when a material is not to be recommended.

The opening address of the conference was by Dr. C. B. Hutchison, dean, College of Agriculture, University of California, Berkeley. (Full text of Dr. Hutchison's paper will appear in next months issue of *Agricultural Chemicals*).

A paper by W. W. Robbins, Botany Division, College of Agriculture, University of California, Davis, was entitled, "History and Development of Weed Control." He reminded his audience that in weed control, as well as all other business effort, costs and profits have had always to be considered. Tillage and cropping are still standard methods of weed control, but as far back as the period of 1896—1910 it was realized that broad leaf plants could be killed with chemicals without harming plants with small leaves. In 1911 acid from 6 to 10% was used to kill annual weeds. Italy, France and Norway were the first to use selective weed control materials. Powdered kainite was used to kill the weeds and it also fertilized the grain. The use of new chemicals is the most important recent development in agriculture. He summarized by saying that the greatest progress has been made in chemical methods of control. In this field, the discovery and use of selective herbicides rank first; herbicidal growth - regulating substances are the most noteworthy. Following closely in importance are the improvements in general contact herbicides, in fortifying and activating substances, and in soil sterilants.

Marked and rapid advancement has been made in machinery and equipment for the application of herbicides. Of particular significance is the development of equipment and materials which permit of low-volume applications.

Satisfactory progress has been made in the control of any one specific weed or type of infestation *only when* special and direct attention was given to it bringing to bear on the problem fundamental biological studies. These called for the services of plant physiologists, plant morphologists, chemists, agronomists, and agricultural engineers.

The educational phases of weed control have been neglected, this pertains to resident instruction in colleges of agriculture and to extension departments. The grower needs to know more than the *names* of the weeds if he is to practice economical weed control. In the past the majority of the weed bulletins and circulars dealt chiefly with species identification.

Analyses of the factors which enter into the production of a unit of food are being made with the same care as are those which are considered by the manufacturer of non-organic items. Seemingly overnight, weeds have emerged as a major factor in food production.

Directors of Experiment Stations, and all others who dispense agricultural research funds, must be advised of the need for weed control, and for basic biological investigations bearing on weed control, and for facilities and personnel required to carry on these projects to a practical conclusion.

A. A. Brook, Director, State Deparment Agriculture, Sacramento, spoke on the regulatory aspects of pests control. Control of weeds, plant and animal diseases, and harmful insects increases food production. However, regulated control is frequently overlooked in our thinking. After development of useful measures, a few may neglect or refuse to use the remedial measures. When a producer refuses to cooperate, the Department or the County Agricultural Commissioner has authority to compel compliance with the law. An individual must comply when majority benefit is involved. In the case of primary weed pests which spread from place to place, there must be some control lest not only may the crop be lost, but loss of the land may also follow.

Lewis Evans, U. S. Dep't of Agriculture, Beltsville, Maryland, presented a paper entitled, "Recent Developments in Herbicides." Men do not generally give in to fashion in weed control, he said, but there is something about 2,4-D, suggesting a fad. Each new development and any new formulation or method of treatment should be viewed critically before acceptance. "IPC," isopropyl phenyl carbamate, has been summarily dismissed in some quarters because it failed to live up to some of the early claims for it. It is unfortunate that clean cultivation or "shoot cutting" has been so de-emphasized that it no longer receives the recognition it deserves in perennial weed control programs. Instead of numerous empirical tests, trials should be integrated differentially with the same caution used by entomologists, Mr. Evans said. Merely to kill the tops of plants is not weed control. What is the effect on the roots?

One hundred fifty to 200 pounds per acre of "ATA," ammonium trichloroacetate, have been used with considerable success against Bermuda and Johnson grasses and quackgrass. Pentachlorophenol in Hawaii, herbicides as potato top killers and cotton defoliants, and pre-

emergence sprays were discussed. In pre-emergence treatments the herbicide is applied just before the crop seedlings emerge and after the weeds have started. Deep planting will allow the crop seed to germinate and develop in a layer not affected by surface application of the herbicide. Another form of pre-emergence practice consists of fitting the seed bed in the normal manner, waiting until the weeds have emerged, spraying the weed growth, and then planting the crop with special knife-like tools which disturb the soil as little as possible.

W. T. Moran, Head, J. M. Shaw Chemical Laboratory, U. S. Bureau of Reclamation, Denver, Colorado, told of the Bureau's research program and its relation to the conference. He discussed water weed control and the heavy losses sustained by irrigation systems due to weeds on banks of ditches. These weeds reduce the capacity of canal channels and make it difficult to deliver sufficient amounts of irrigation water; their silting action necessitates costly dredging; and when the water level is raised, there is loss of water through increased evaporation and seepage, erosion damage to canal banks, and often costly ditch breaks. Water weeds also impair the efficiency of drains and contribute to the water-logging of farm lands and the formation of alkaline deposits in the soil. He mentioned one system that lost 30,000 acre feet of water valued at $39,000 due to weeds and other plants growing on ditch banks. Many chlorinated hydrocarbons and other compounds will kill water weeds, but nothing has yet been found that will compete with the aromatic solvent naphthas in availability, efficiency, and cost. A concentration of emulsified solvent at 185 parts per million maintained for a period of 60 minutes was successful. Within 72 hours after treatment, the ditch was free of weeds for a distance of one mile below the point of application.

Biological Control of Klamath Weed was discussed by James K. Holloway, University of California. He had supervised the introduction of 300,000 beetles into California from Australia to control Klamath Weed which was infesting several millions of acres of range land in northern California. This project has been under consideration for several years. Klamath weed or St. Johnswort, a *Hypericum*, which also occurs in Oregon and Washington, is particularly adapted to biological control, although recently the application of borax has been used to control new and small infestations.

Plane Demonstrations

ON the morning of the second day the Conference assembled at University Airport adjacent to the College of Agriculture campus to see the spraying planes (mostly Stearman) on display. The pumps on the ships were of various types. Some of them were driven by engine power take-off, others were propellor driven, and still others by electric motors. There were various systems of nozzles, single or clusters, and booms from 6 to 30 feet in length. The 6-foot boom was said to be easy to remove and replace with a dust hopper. The new whirling brush distributor, Hawk type, attracted special interest. Exhibitions were made of spraying with 2, 10 and 13 gallons per acre. Two supply trucks were exhibited.

An approximate estimate of the number of pilots engaged in application of herbicides, insecticides and fungicides in California in 1947 was 225. This group used about 300 planes, since about one-third of the pilots used two planes each — one for applying liquid sprays and the other for dusts. California planes serviced parts of Nevada, Utah and Oregon, and it is estimated that additional pilots and planes in the Western States would double the previously given figures.

In California during the year 1946, some 296,059 acres were treated with various agricultural chemicals by plane, and in 1947 incomplete figures show the acreage to have more than doubled. The figures would exceed a million acres if crop planting were included. At the time of the meeting of the Western Weed Control Conference, 247 herbicides were for sale within California. Of these, 127 contained 2,4-D and were registered, with the State. This indicates the importance of the development in weed control and emphasizes the potential business.

The agricultural flying service in California operates on a year-round basis, since its activities include dusting, seeding, fertilizing or spraying every single month, with a gross income from these operations approaching ten million dollars. This industry has outgrown the old barnstorming days and is realizing that sound business practices, reliable service and efficient use of equipment are essential for success in what is becoming a highly competitive field. It is noteworthy that the county having the most severe ordinance is the one where the most crop dusting and spraying are done by plane. Sprays are being used more and more as they settle whereas dusts drift uncertainly.

Air control of pests is here to stay, and is rapidly expanding. Many chemical companies realize that their products must be compatible with air application. The new herbicides seem made-to-order for plane application. Powdered insecticides are made with planes in mind, and some companies make special mixes of fertilizers more granular and with less lumpiness than customary in standard preparations.

Equipment Displayed

ON the College of Agriculture, Davis, campus there were exhibited approximately 35 ground equipment sprayers of both open and pressure tank systems with paddle, hydraulic or air agitation, besides numerous chemical injectors, stationary spraying units, pumps, nozzles, tractor attachments, and similar accessories. Nothing like it has been seen before. Developments are so rapid that the exhibition would not have been so complete if held a month ago, and might have had more to display if held a month later. There were various types of pumps; plunger, centrifugal, rotary or gear, airpumps, and other types. There were big and little, round and folding, and

DIRECTORS

W. C. BENNETT
President, Phelps Dodge Refining Corp., New York.

J. HALLAM BOYD
Exec. Vice-President, Commercial Chemical Co., Memphis, Tenn.

ERNEST HART
President, Niagara Sprayer & Chemical Division, Food Machinery Corp., Middleport, N. Y.

LEA S. HITCHNER
Executive Secretary, AIF Association, New York.

GEORGE F. LEONARD
Vice-President, Tobacco By-Products & Chemical Corp., Louisville, Ky.

HOWARD P. MANSFIELD
Assistant to General Manager, Grasselli Chemicals Department, E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

A. W. MOHR
President, California Spray Chemical Corp., Richmond, California.

JAMES McCONNON
Vice-President, McConnon & Co., Winona, Minn.

E. H. PHILLIPS
Vice-President In Charge of Purchasing, Co-operative G.L.F. Soil-Building Service, Ithaca, N. Y.

GEORGE R. RINKE
Chairman of the Board, John Powell & Co., Inc., New York.

FRED SHANEMAN
Vice-President, Pennsylvania Salt Manufacturing Co., Philadelphia.

F. S. WASHBURN
Director, Agricultural Chemicals Division, American Cyanamid Co., New York.

BYRON F. WEBSTER
Vice-President, Chipman Chemical Company, Inc., Bound Brook, N. J.

H. DEWITT WHITTLESEY
Sr. Vice-President, Sherwin-Williams Co., Cleveland, Ohio.

F. W. WIEDER
Western Division Manager, Stauffer Chemical Co., San Francisco, California.

AIF Meetings

THE twice-a-year meetings of this Association provide an invaluable forum for information on the fast-moving developments in the widening field of pest control.

Reports from the Washington meeting, in this issue of *Agricultural Chemicals*, illustrate the value of such meetings to Association members.

CO-OPERATION · A.I.F. ASSOCIATION · INTEGRITY · FAIRNESS

Agricultural Insecticide & Fungicide Association

285 Madison Ave. **New York 17, N. Y.**

OFFICERS

GEORGE F. LEONARD, *President*
LEA S. HITCHNER, *Executive Secretary and Treasurer*

long and short booms designed with great ingenuity to fit various needs. Many ingenious innovations appeared in many lines. People with nothing to sell were kind enough to exhibit equipment they had developed. Tehema County displayed specialized equipment its men had originated.

The advocates of low volume of concentrated material and of larger volume of dilute material were both prominent, and some others hold that it is the basic amount of chemical per acre rather than volume (dilute or concentrated spray) that counts. No one ventured to know the dividing line between high and low volume. Many a manufacturer is puzzled, and one indicated his equipment could be adjusted to apply from 2½ to 100 gallons per acre, so that a farmer will not everlastingly have to purchase new equipment to keep abreast of the times.

Several excellent nozzles and systems of cleaning filter screens were exhibited. Nozzles are standardized in gallons per acre on the basis of screen mesh, liquid pressure, and speed of equipment. 2,4-D and similar materials cannot be allowed to drift. Nozzles are now made with instant shut-off and some of the fine opening nozzles have 200 mesh continuously washed strainers and settling space that prevents plugging. Such improvements facilitate changing volume per acre application. The outlook for the 1948 war on weeds by new chemicals and by spraying and dusting equipment indicates an activity far surpassing the unprecedented progress made in 1947.

On Tuesday evening, February 3, with Dr. W. W. Robbins as toastmaster, there was a special Western Weed Control Convention dinner with ladies present at Hotel Senator. Excellent entertainment was furnished by Sacramento Convention Bureau Ensemble.

Williard Speaks

ON the 3rd day a report of the North Central Weed Control Conference was made by its president, Dr. C. J. Williard, Associate in Agronomy, Ohio State University, Columbus, Ohio. He pointed out the relationship between weeds, insects and plant diseases, and noted there are less than 200 weed research men in the U. S. However, there are hundreds of articles compared with tens a few years ago, and weed control is growing up. He warned against shipping weed seeds all over the country and that industry itself must do a great deal of research. The public should match whatever is done for the good of all. Replication of experiments is not duplication.

As an untiring worker who has contributed much to weed control, for doing an excellent job, and to one whose efforts are largely responsible for the Western Weed Control Conference, there was a presentation to Walter S. Ball as a token of gratitude for what he has accomplished.

The head of the Railroad Co-op Weed Control was introduced and interestingly pictured their problems of weed clogged ditch banks, fire hazard, brakemen scratched by star thistle, etc.

State reports of Official State Representatives were presented. Interesting highlights are:

Murray Prior, California Department of Agriculture, reported that 250,000 acres (or 10%) of barley, wheat and oats in this State were selectively treated for control of broad leafed weeds. The worst pests are morning glory, Russian knap weed, and hoary cress. In 1947 100,000 acres of rice were sprayed with selective weed control materials, as compared with 8,000 acres in 1946, largely for control of water plantain, arrow head lilly, bull rushes, and similar plants. He also mentioned control of weeds by electricity.

Lee Burge reporting from Nevada asked where the nation would be if weeds had been properly handled for the last 15 years. Nevada would not now have its 40,000, acres of weed infested land, a damage of a million dollars. He said 10% of Nevada is out of production on account of weeds. In addition, infested areas are nuisances and breeding places for insects. Fleabeetle, thrips and lygus bugs bred in mustard and migrated in such numbers to potatos that the fields had to be abandoned.

Time was so short that officials reporting for other States merely listed such factors as the weeds controlled, handling of ditch banks, improved uses of materials, effectiveness of extermination areas and of weed laws, quarantines, set backs of weed control during the war, materials which are most commonly used, and the opinion that good farming and chemicals may keep abreast

Discussing Herbicides at Western Conference

Prominent among those attending the tenth Western Weed Control Conference at Sacramento, California, were these men, seen here discussing the program. From left to right, they are: Dr. K. S. Quisenberry, U. S. Department of Agriculture, Washington, D. C.; Walter S. Ball, Sacramento, Calif.; Dr. W. W. Robins, Davis, Calif.; and Dr. Virgil H. Freed, Corvallis, Oregon, retiring conference president, who was succeeded by Bruce Thornton, Ft. Collins, Colorado.

of weeds. The State of Washington Department of Agriculture, W. C. McMinimee, State Weed Control Supervisor, 301 Old Court House, Yakima, Washington, distributed its "1948 Survey of Most Noxious Weeds" by counties, copies of which may be requested.

Dr. K. S. Quisenberry, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Chemical Engineering, speaking on the National Weed Control Problem made an excellent address. Weed control is a national problem and anything done nationally helps everyone, for the weed problem cuts across all crops. Thousands of acres of land infested with white top, bindweed, and other creeping perennial weeds have been restored to production. Kansas, Nebraska, Idaho and California were mentioned for early work. Research was slowed down during the war and application has sometimes successfully gone ahead of research. Water hyacinth of Gulf Coastal areas interferes with navigation and affects the supply of fish. 2,4-D is slow acting but effective. Sinking the dead mass is a problem. The soil that produces nutgrass in Mississippi and Georgia is treated with ethylene dibromide and chloropicrin. Approval with some funds has been obtained to establish a Cooperative National Weed Research Program in Holtville, California. Basic research is needed to understand the underlying principles explaining why 2,4-D kills some plants under certain conditions and not others.

Wm. A. Harvey, Botany Division, University of California, Davis, chairman, in behalf of the Research Committee recommended greater uniformity in research in order that the results can be better interpreted. At present it is impossible to explain good results in one situation and poor ones elsewhere. Basic information is needed:

1. How does the plant acquire the chemical; absorption through the leaves, through the roots from the soil or in what manner?
2. What takes place after a chemical enters a plant? Why does one get different results, when he has conditions which he thinks are identical?
3. Movement of chemicals in a plant (translocation), what is the actual action on plant cells; simple solubility, or complex operations?

The chemistry of the herbicide may play an important role. Why are some plants resistant when dry and not when wet? What particle size is needed for application? In considering use of the latest chemicals, don't forget to consider that perhaps some older method, for example, cultivation, may be better; or a combination of chemicals and cropping. Information is needed as to just how much competition a given weed offers in a cultivated crop.

Lambert Erickson, University of Idaho, Moscow, Idaho, under the subject of "Field Plot Technique" discussed methods of laying out plots

(Turn to Page 74)

The Listening Post

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

LATE blight (*Phytophthora infestans*) was observed on fall tomatoes in the Sanford area on the northern east coast of Florida October 16 and 18. Some plants showed severe leaf symptoms, and a few infected fruits were seen. Between the middle and the end of December the disease appeared in the Everglades and southern east coast areas. Where growers follow recommended control programs it has not become a problem. However late blight has been severe in gardens and fields where it is not controlled. Potatoes have been affected in both Everglades and east coast areas but efficient treatment of the fields observed had confined infection to only occasional lesions.

Early in November the disease was found on fall potatoes on Wadmalaw Island about 20 miles southwest of Charleston, South Carolina. Later in the month it appeared on volunteer potato and tomato plants on the truck station farm eight miles west of Charleston. All volunteer plants were killed by frost December 1, but the disease had already spread to tomatoes in the station greenhouse. However, the disease was checked by use of a copper dust and by keeping the plants as dry as possible.

Severely affected potato plants were observed in Terrebonne Parish, in southern Louisiana, on December 4. Weather conditions preceding the appearance of the disease were said to be ideal for its development. The source of infection could not be established.

Injury?

A CASE of "the cure is worse than the disease" has been reported from Oregon in connection with a spray program for the *carpophilum*) and dieback.

The results of this spray program, according to A. P. Steenland, which included an 8-4-100 spray with Bordeaux after fruit picking and before the fall rains began, became apparent in October and November, 1947. Sprayed trees had dark red to black lesions on the dark-colored side of the new wood, lesions varying in size from a few per foot to complete coverage. The greater number of lesions appeared on trees that had been thoroughly sprayed with Bordeaux, unsprayed trees being unaffected. Isolations from the lesions of affected twigs yielded, in one case, 30 sterile plantings, *Fusarium* sp. from three, and *Alternaria* sp. from two.

Corroboration from like lesions and isolations was obtained from seedlings of two-year-old peach trees from five nurseries, two of which had been sprayed with Bordeaux, and two dusted with 90 percent sulfur and 10 percent "Fermate." Lesions were abundant on the sprayed seedlings and, of the two-year-old trees inspected, the Bordeaux-sprayed trees had typical lesions, whereas no lesions were noted on the unsprayed trees. These lesions were dark red in color and did not extend into the wood. The epidermis was somewhat blistered and, when removed, a red purple color was noted. Repeated isolations for lesions found on seedlings and two-year-old trees of the sprayed stock from other nurseries yielded only the previously noted *Fusarium* sp. and *Alternaria* sp.

Experiments have been planned for the coming year to watch the possible further growth of existing lesions on two-year-old trees and to check on the injurious efforts of Bordeaux when applied as an early Fall spray for Peach Blight.

The serious proportions which Fire Blight (*Erwinia amylovora*) attained in the pear orchards in the Wenatchee District of Washington during the past season have caused some worry not only to growers faced with possible loss of trees or reduction in crop before maturity, but to handlers and processors whose concern is with storage qualities of infected fruit and possible losses.

In connection with storage loss, results from experiment reported by T. R. Wright show that Fire Blight does not seem to cause extensive damage in storage and transit so long as large quantities of visibly diseased fruit are not included in the boxes. Fortunately, this eventuality is somewhat precluded by the fact that packers would undoubtedly not care to handle diseased fruit which is unpleasantly sticky to the touch.

Results from controlled experiments demonstrate that under storage conditions fruits sprayed with a suspension of ooze of the blight bacteria show no infection at 30°, 35°, or 40° F. after seven weeks' storage. Infection of healthy pears proved possible through contact, but six weeks were required at 30°, indicating the very slow progress of the pathogen in the host. At higher temperatures of 35° and 40°, and with contact of fruits, lesions developed in five weeks but these high temperatures, causing core breakdown and scald, are not used commercially. At 65° shallow lesions formed in seven days with contact maintained during

this period. In this case, likewise, commercial practice would obviate this danger as the diseased pears would be removed in grading prior to being placed in the ripening room.

Fire Blight appears then to be of little consequence after the fruits have left the tree and healthy pears apparently won't suffer too much harm if small quantities of infected fruits are their neighbors under packaging.

B.E.P.Q. Distributes Pest Control Information

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

AN all-out fight against insects, rodents, and other pests of food and feed crops was announced by the U. S. Department of Agriculture last fall as an important phase of the program to conserve grain needed for hungry people abroad. An essential part of the job involves making available to farmers and others concerned information regarding the losses caused by such pests and the remedies that can be used to help reduce or prevent losses.

The Bureau of Entomology and Plant Quarantine, in cooperation with other agencies in the Department, including the newly-created Office of Food and Feed Conservation and the Extension Services, is making a special effort to prepare and disseminate various types of informational materials in furtherance of this program. It is hoped that these will aid in stimulating the wider use of available methods for reducing insect losses to grain, livestock, and growing food and feed crops.

It was suggested that readers of the "Listening Post" might be interested in an account of the informational activities being carried on by the Bureau of Entomology and Plant Quarantine in support of this program. A brief discussion follows, therefore, of materials that have been issued to date, of items currently in process of preparation, and of projects that are planned for the next few months.

The new U. S. Department of Agriculture handbook entitled, "Grain Conservation On Farms," distributed in November 1947, included a short section on insect control. A more complete discussion of insect control in relation to food and feed conservation will appear in a revision of this handbook now being prepared.

A series of seven press releases, dealing specifically either with the prevention of insect losses to food and feed, or having an important bearing on that subject, have been issued since last fall through the regular press channels of the Department. Further releases on various aspects of the subject will be issued from time to time.

An article on the importance of protecting stored grain from insects and rats appeared on the USDA page of the February issue of the *Country Gentleman*.

Particular attention is being given to the preparation of a series of so-called "fact sheets." These contain available information on estimated losses caused by insect pests to food and feed crops and give in concise form recommended methods that can be used to reduce or prevent such losses. These "fact sheets" are prepared in cooperation with the Office of Food and Feed Conservation and are based on factual information provided by the BEPQ. They are distributed to field personnel of the Department and State agencies, including extension workers, industry, and interested individuals. The distribution is handled by the Office of Food and Feed Conservation. Three fact sheets relating to insect pests have been issued to date. The first, "Save Farm Grain By Fumigation," was released about the middle of January; the second, entitled "Save Grain By Controlling Pantry Pests," was issued toward the end of January; and the third sheet, entitled "Save Farm-Stored Grain From Insects," became available on February 18. The popularity of these "fact sheets" is evidenced by the requests that are being received for them. The original stock of 100,000 copies of each of the first two issued had become exhausted within a few weeks following their release. The preparation of three other "fact sheets" is well along toward completion and these will be distributed soon. One release deals with the conservation of grain by controlling pests of livestock, and the other two deal with methods for saving corn from losses due to the European corn borer and grasshoppers. Consideration is being given to the preparation and issuance of several additional "fact sheets" on insects. These will deal with the saving of food and feed by using available methods for controlling insect pests on cotton and canning crops; the control of specific pests such as the alfalfa weevil, chinch bug, velvetbean caterpillar, and hessian fly on food and forage crops; and the production of more seed by adequate insect pollination. Preliminary work has already been started on some of these.

Plans are also under way to issue, in cooperation with the Extension Service, several leaflets of a popular type that will have a direct bearing on insect control in relation to food and feed production and conservation.

Opportunity is being taken, whenever possible, to use the radio as a means of encouraging farmers

(*Turn to Page 75*)

Comments....

By Dr. Alvin J. Cox

This column by Dr. Cox appears as a regular feature of AGRICULTURAL CHEMICALS. Dr. Cox formerly was successively Physical Chemist, Chief Chemist, Assistant Director, and Director of the Bureau of Science, Government of the Philippines. He was appointed Chief, Bureau of Chemistry, California State Dept. Agriculture in 1932, retiring in 1945.

Western Co-op Fruit Spray Conference

THE twenty-second annual meeting of the Western Cooperative Fruit Spray Project Conference was held in the Streamline Room of the Imperial Hotel, Portland, Oregon, January 21, 22nd and 23rd, 1948.

This is an organization of research workers with a membership comprising personnel from many of the experiment stations of the States of California, Colorado, Idaho, Montana, Oregon, Utah and Washington; the British Columbia Provincial Department of Agriculture; the Divisions of Entomology, and of Botany and Plant Pathology, of the Dominion of Canada Department of Agriculture; and the Bureaus of Entomology and Plant Quarantine and of Plant Industry, Soils and Agricultural Engineering of the United States Department of Agriculture. This gathering had an attendance of seventy-five at the closed sessions; but about two hundred and twenty-five attended the open meetings. These were largely representatives of commercial companies, fieldmen of grower's organizations, and others interested in spray materials and spray programs.

After reading of the minutes, Chairman E. J. Newcomer appointed committees including one to prepare a program of suggestions, These suggestions, (often regarded by the public as recommendations) were published in *Agricultural Chemicals* February issue. Field and laboratory tests were reported upon in the closed session. Some of the high-lights of these sessions were as follows:

The spider mite population in the well-known mite areas has gradually increased until there are now the largest over-wintering populations ever experienced. These present a greater problem than codling moth. Problems of Willamette mite, 2-spotted mite and European red mite especially on pears and apples were discussed. During 1947 the European red mite has become a problem for the first time in some localities and this species is perhaps the most difficult of all to control. The build-up is attributed to the extensive use of DDT for control of codling moth. This insecticide has functioned unfavorably on mite predators. The presence of mites not only reduces yields of fruits but also decreases the value of apples by reducing the color and lowering their grade, in some cases below "C" grade.

The important problem is how to control mites without blotching, spotting or other deleterious effects on fruit; and allow the trees to remain with healthy green leaves. Defoliation or burning either from mites or treatment regardless of weather conditions is to be avoided. In 1945, two applications of "DN-111" with DDT controlled the Pacific mite on apples. In 1946, two applications were not enough, and in 1947, five were required to do the job. Very few insecticidal products can be recommended, as they produce superficial spotting and lower the grade of the apples. Emphasis was laid on the importance of killing mites and their eggs over wintering on the trunks and especially on the underside of the larger branches of the trees. Complete coverage will delay the seasonal build-up. Dormant spray oils will kill the eggs. Pink and calyx sprays will kill the young mites. There are many products on the market to kill mites, but many of these have little or no effect on the eggs. The population may thus reappear within a week or two.

Variations in performance of different insecticides are often so great that one can actually pick out the trees on which certain products were used. Also some materials will not be used on account of their hazard to operators. Only those products are favored which: (1) are tolerant to plants and have a pronounced residual effect, (2) require a minimum number of applications per season and (3) preferably should be compatible for mixing with other sprays. A warning was expressed that special caution should be exercised by users in selection of materials. Various manufacturers will pass along products for various formulations, and a grower should know the source of his material. It is accepted that application of acaricide must be made and the infestation eliminated in advance of mite build-up. The effect on bees and the residue that may remain at harvest time from the application of

acaricides was regarded as serious.

That DDT has a slight repellancy toward bees, was expressed at the gathering. Statements were made that with the new insecticides losses of only some of the bee field force are likely to be experienced, whereas arsenic can kill the brood and probably the queen.

A report was made on small fruits with figures presented showing the control of orange tortrix and mites on raspberries. Parathion was effective against aphids on hops, and BHC was effective on aphids but not on mites.

Since woolly aphis goes along with mites, its control was discussed. Two and a half lbs. of BHC (10% gamma isomer) and ½ lb. parathion (15%) as used for mite control were both said to afford outstanding results, and the fruits were free of any odor or flavor of the spray. One group uses BHC and oil or nicotine sulphate and oil against this pest. The opinion was expressed that methods of evaluation need to be reduced to a standard unit for correlating injury with a given population. A uniform method of making mite counts is especially desired. Aids that will simplify and reduce the work are needed.

DDT for control of codling moth has been so effective that there was little need for discussion. Experimenters in some regions will recommend as low as two sprays of DDT during the 1948 season. The principal discussion was regarding the possibility of using more concentrated material in smaller amounts; perhaps two gallons in lieu of twenty-five gallons of spray and fewer applications than at present. This would eliminate hauling water, reduce the drip from trees, and less injury to the soil would result from the lighter machines required for ground use.

Numerous Insects Studied

THE session of January 22nd opened with consideration of San Jose scale and prune thrips. Very little new information was given on control of this pest. Dusting the soil under the trees using a canvas drag has been less successful than spraying the ground.

Peach insects came in for important consideration. An unusual method of spraying in the fall for control of peach aphids, and eliminating them as a vector of disease, is being used in Colorado with excellent results. Migration studies have been made and the program is built around killing the generation that produces the sexual females. DDT at one pound per one hundred gallons was applied September 24th and October 12th. All materials tried gave significant control except chlordane. The results of treating shot hole borer on September 19th and 22nd with DDT (50%) 2 lbs. per one hundred gallons, and parathion (25%) 1 lb. to one hundred gallons looked promising after 2, 5, 7 and 30 days. There was no injury from use of ethylene dichloride against peach root borer in sandy soil. Different conditions such as a change to a heavy soil or another climate may affect the results and

these should be determined in advance of commercial use of the material. Complaint was offered that some mixtures of ethylene dichloride are not adequately emulsified by the manufacturer. Propylene dichloride was said to be more effective than ethylene dichloride, but not recommended for a summer trunk spray. Ten percent DDT dust was used against climbing cut-worms; 2 ounces in the crotch of the tree and on the ground around the tree gave good control. Benzene hexachloride was also effective. Heavy rain was a factor in control of Pacific mite by washing the pests and webs from peaches; there was no effect on European red mite. One member reported that lady-beetles avoid trees sprayed with DDT. They deposit an egg or two and then leave. Two to three hundred eggs were found in comparable non-DDT treated blocks. It was said that one could tell to the tree where DDT was used, by seeing the egg masses.

Several promising materials for control of black peach aphis were discussed. Few conclusive results in control of lygus bugs were available on account of the low population during the year. Control of the western 11-spotted cucumber beetle on peaches was obtained by use ten days before harvest of a 3% DDT-fifty to ninety percent sulfur—one percent dianisyl trichlorethane dust. Under these conditions the maximum residue was DDT four p.p.m. The chief injury from the beetle is the entrance of brown rot spores through the abrasion made by the bite of the beetle.

Pear psylla was found in Spokane in 1939 and control work was started by the Federal Government the next year. The scope of the work gradually increased during the war period. The control program now attempts to hold the pest in the regions where it occurs, rather than to attempt extermination. None has ever been found in California or the Hood River Valley. There has been little increase or migration to new areas as determined by sticky boards or sticky bands around trees. The pest is no longer sufficiently abundant for proper tests of the effectiveness of new control materials. No wide spread of the pest is expected at once, but many growers on the Pacific coast will eventually have to use means of controlling it. In a modified program the government has furnished the materials, nicotine and oil. This has been discontinued as being no longer justified as a government project. Owing to scarcity it is improbable that nicotine sulfate, which has been the standard insecticide against this pest, will be available in sufficient quantity to meet the demand. Therefore, experiments are being carried on to find something else to do the job. Parathion and "Toxaphene" are both good and about equal in nymphal efficiency and have a high adult knock-down, with no plant injury. Dormant oil alone does fairly well. In the absence of nicotine sulphate, one pound of rotenone per one hundred gallons spray helps the oil. Piperonyl cyclonene left russet rings when spray

dried. BHC at 1½ pounds with two quarts foliage oil did no injury and the odor did not persist until harvest where used prior to July 1st. Chlordane was ineffective.

Plant pathology shared in the discussions. "Fermate" and "Zerlate" perform about equally in control of pear scab. There is some variation in effectiveness due to change in fillers. An annual increase of 30 percent for the last three years was reported in yield of D'Anjou pears, equivalent to three million dollars annually for farmers. This was accomplished by getting away from use of sulfur which affected setting of the fruit. There was no benefit from "Fermate" on iron deficiency.

So-called California blight (or die-back) of peaches was reported to be largely injury from the two applications of 12-12-100 Bordeaux mixture dormant spray against peach leaf curl. Copper applied to pear trees as a spray or dust just before a rain in blossom period is fairly effective in control of bacterial fire-blight. Bordeaux mixture can be added to the calyx spray, but it is inadvisable to combine copper with "Fermate" which is wanted for scab control. There is improvement if copper is applied before a rain.

The virus disease known as "Little Cherry" is somewhat like "Quick decline" of citrus. It is not fast at first, but an orchard remains productive only two or three years after infection. One area in British Columbia that had thirty virus-infected trees in 1946, had over three hundred in 1947; there is no effect evident on the trees themselves even after several years. The symptoms are manifest only in the fruit about two weeks before picking, and the nearer to picking time, the easier the symptoms are to see. The Bing variety was least affected, but no insect vector was found, although there was some evidence against leafhoppers.

Miscellaneous items were offered for comment but not necessarily answered. Criticism has been made of storage rots and quality of fruits. Is the trouble seasonal? Is it related to pest control programs? It is believed to be related to harvest time. Overripe or improperly cooled apples at picking are more susceptible to early break-down in storage, which suggests that farmers should be more careful that fruit is not over ripe when picked.

Compatibility Discussed

AN important discussion of compatibility was carried on. Example: what acaricide can be applied following pear scab control measures? The manufacturers should know and think of products with which his is likely to be combined, and furnish adequate necessary warning.

Cherry fruit fly was reported to be controlled by chlordane and by chlorinated camphene. Oriental fruit moth infestation in Idaho was said not to be increasing. California was reported to have discontinued its research work on Codling moth infestation; and treatment to preserve predator balance in Paine variety walnuts was described. In some localities

(*Turn to Page* 71)

Technical Briefs

Rodent Control Factors

The control of rats, prairie dogs, and ground squirrels in the southwestern U. S. by means of poisons is reviewed. Some animals refuse to feed on poison or natural food after the effect of a sublethal dose has worn off. Subsequent attempts to use the same poisoned bait are less efficient, and the rodent population increases in spite of control efforts. Increasing the poison concentration may help to a degree but is accompanied by decreasing consumption. Although the taste of a poison is a factor in bait refusal by rodents, even tasteless thallium compounds did not prove entirely satisfactory.

Prebaiting with unpoisoned food and alternating unpoisoned with poisoned food have given good results, but in some areas even this schedule has failed to hold rodents in check. Seasonal preference for grains and availability of succulent green food are factors in bait refusal. Use of fumigants as a supplemental treatment to poisoned baits is successful under appropriate conditions. Carbon disulfide works best in tight, wet soils. Control measures are no doubt causing an artificial selection whereby the least resistant individuals are killed and the more resistant are left. E. E. Horn, Trans. *8th N. Am. Wildlife Con. 1943*, 417-23.

•

Toxicity of BHC

The toxicity of commercial benzene hexachloride to laboratory mice was determined by administration, and by application to the skin as a water dispersion. Cows were fed or dipped in water suspensions. The approximate LD50 for mice was about 0.6 gram per kilogram of body weight. Mice dipped or sprayed with 1-5 per cent of benzene hexachloride showed kills up to 5 per cent in small samples. Two cows withstood 0.05 gram and 0.074 gram per kilogram of 50 per cent wettable benzene hexachloride without showing ill effects. Range cattle dipped in 0.5 per cent benzene hexachloride showed no ill effects. D. P. Furman, *J. Econ. Entomol. 40*, 518-21 (1947).

•

Preflood DDT Treatments

A field test was made with a 10 per cent DDT dust, at 1 pound of DDT per acre, in a salt-marsh island off the coast of Florida. Part of the island served as a check area. The treatment gave complete control of mosquito larvae hatching after three floodings by rainfall or high tides. After the fourth flooding a few larvae were found. The results indicate that preflooding treatments with DDT dust may be very effective against salt-marsh mosquitoes. S. R. Bose, A. B. Bose, and K. L. Dey, *Science 107*, 63-4 (1948).

•

Use of Colored Baits

The acceptance of colored baits by birds and rodents has been studied. Diurnal rodents are generally regarded as unresponsive to colors, while some colors are rejected as food by birds. It is concluded that use of color in lethal baits for rodents offers promise of lowering the accidental death of seed-eating birds, and may permit the use in rodent control of certain highly toxic poisons not now employed. E. R. Kalmbach. Trans. *8th N. Am. Wildlife Conf. 1943*, 408-16.

•

Soil Nutrient Placement

The percentage utilization by plants of mineral nutrients applied as fertilizer supplements varies with soil conditions and with the solubility and other properties of the elements involved. Most inorganic forms of nitrogen are readily soluble and mobile in soil and are, therefore, relatively accessible to plant roots. On the other hand, phosphates, which quickly form insoluble compounds, tend to remain where they are placed in soil and have a low percentage utilization. Similar considerations apply to other major and to trace element supplements commonly required to counteract specific deficiencies. Some can be applied directly as fertilizers (e.g. boron) while for others (e.g. iron) such methods as spraying foliage with nutrient solutions may be more practicable.

The commonest method of applying a mineral supplement to a soil is to broadcast it over the surface, but there are sound theoretical reasons why such supplements as phosphates are likely to be more effective when placed close to the seed than when they are broadcast and more or less uniformly incorporated with the soil. Experiments have been carried out to compare broadcast and drill applications of fertilizers on different crops, and the results generally are in agreement with what could be expected from consideration of the properties of the elements involved, the requirements of individual crops and soils, and the varying farming systems followed.

—*A. B. Stewart, Aberdeen, Scotland. Presented at London Conference, 1947.*

•

1948 Fertilizer Outlook

The "Agricultural Situation," booklet published by the Bureau of Agricultural Economics of the U.S.D.A. states that agriculture in the U. S. will have available fertilizer in amounts nearly double the prewar quantity. About 4 percent more nitrogen than last year, 5 percent more potash, and 6 percent more phosphate are in prospect, according to W. G. Finn and L. G. Porter of the P. and M. A., authors.

•

Tomato Fertilizer Tested

Bands of fertilizer along the rows, coupled with fertilizer plowed under, are proving to be best for tomato plants, according to tests by Prof. C. B. Sayre, Geneva, N. Y. experiment station. Best yields were obtained when 300 pounds of 6-18-6 fertilizer were applied in bands along the row and the bulk of it plowed under. The rate of 1,000 lbs. per acre was most profitable.

Suppliers' Bulletins

T-H Bulletin on 2-4-D

Thompson-Hayward Chemical Company, Kansas City, Missouri has just completed a 1948 revision of its technical bulletin on 2,4-D herbicides entitled "Ded-Weed for Agriculture." Information on the use of 2,4-D herbicides is given along with detailed recommendations for use of the company's group of 2,4-D weed killers which include the amine salt, ester, soluble powder and dust formulations. This bulletin is available in small quantity without charge.

•

DDT Toxicity Discussed

Michigan Chemical Corp., St. Louis, Mich., in its Feb. 6 issue of "Pestmaster Progress," contains an article on the toxicity of DDT, stating that its dangers are "greatly overplayed." It points out that after four years of use by the army, health officials, in agriculture and in the home, there is not a single authenticated case of harmful results from the proper use of DDT. Never before has any material been so severely and painstakingly tested to establish its safety, and its toxicity is less than that of many other insecticides. It also points out that goats which had been fed DDT survived doses of 1 gram of DDT per kilogram of weight, and that several of such doses were required to constitute a lethal amount. The article also decries the "flood of misinformation by poorly informed writers and even . . . deliberate attempts at misleading the public."

•

Vanderbilt Bulletins

R. T. Vanderbilt Co., has prepared a number of bulletins describing its dispersing agents for agriculture. These include literature on the products "Darvan No. 1" and "Darvan No. 2"; and "Continental Clay"; The pamphlets contain information concerning properties of the products, formulation of wettable dust concentrates, formulas, and answers to a number of questions regarding use of the dispersing agents. The pamphlets are available by writing to the company's Specialties Department, 230 Park Ave., New York 17, N. Y.

•

Offers Spray Information

Hurst Industries, Inc., San Jose, California, have announced a new line of low-volume, high-pressure utility sprayers featuring a "Flex action" boom which maintains the spray nozzles at uniform height above the ground. The equipment is made for small orchard spraying, weed control, livestock and dairy barn spraying. Information is available from the firm's offices, 1849 S. First St., San Jose.

•

Goodrich Weedkillers

B. F. Goodrich Chemical Co., Cleveland, Ohio, has announced two new weed killers: sodium isopropyl xanthate; and allyl mixed chlorophenyl carbonate. The first is a water soluble organic chemical which destroys all growing plants. It is for use in potential planting areas, and can be used as a defoliant.

The latter, is a selective weed killer, having hormone-like action which arrests growth immediately and prevents seed development. It is said to be particularly useful against certain types of grasses such as crab, barnyard, cattails, and similar plants.

•

Cattle Lice Bulletin

Julius Hyman & Co., Denver, Colorado, have announced the availability of their technical supplement No. 203A, "Eradication of Livestock Parasites — Ticks, Lice, Fleas, Flies, and Hog Mange." Address the firm's home office, Denver, Colo.

•

Nozzle Information

Complete information on the firm's line of spraying nozzles is available from Spraying Systems Co., Chicago. One of the newer features is a spring guard for the nozzle, to protect the face of the deflector from bumping or other damage which frequently alters the characteristics of the spray. Write for Catalog # 22, Spraying Systems Co., 4049 W. Lake St., Chicago 24, Ill.

•

New BHC Plant in Texas

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., have announced the beginning of construction on a new plant for making benzene hexachloride at Houston, Texas.

Hercules Presents Exhibit

Portable exhibit panel to be used this year by Hercules Powder Co. for "Toxaphene," chlorinated camphene insecticide used in controlling numerous cotton insects. The panel is scheduled for showing in numerous southern county fairs, entomological meetings, etc. Its debut was to be at the National Farm Chemurgic Council Conference, Omaha, Nebraska early this month.

Standing beside the panel is Frank U. Rapp, head of Hercules' Insecticide division of the Naval Stores Department, Wilmington, Del.

INDUSTRY NEWS

New Agricultural Chemical Firm Launched

Pittsburgh Agricultural Chemical Co., with headquarters in the Empire State Bldg., New York,

W. J. HAUDE

has been organized as an affiliate of the Pittsburgh Coke & Chemical Co., Pittsburgh, for the sale of basic agricultural chemicals. W. J. Haude, former vice-president and sales manager of John Powell & Co., New York, is president of the new company and Dr. Joseph B. Skaptason, former Powell director of technical sales, is vice-president in charge of sales and development. Products sold by the new company are being manufactured by Pittsburgh Coke & Chemical at its Neville Island, Pittsburgh, plant.

Currently a producer of 2,4-D and Antu, the Pittsburgh firm also manufactures other coal-tar derivatives including dinitro orthocresol, phenyl mercury compounds, ammonium sulfate and tar acid oils. A $2,000,000 expansion program in chemical development, a large part of which will be devoted to agricultural chemicals, is now under way. Plans for the addition of new chemical products are included in the field of insecticides, fungicides, rodenticides, disinfectants, and plant hormones. Among some of the newer items which the new sales affiliate will market are BHC, cotton defoliant, quaternary ammonium germicides, weed killers, thiocyanate derivatives, estrogen compounds and others.

DR. J. B. SKAPTASON

On the board of directors of the new Pittsburgh Agricultural Chemical Co. are R. M. Marshall, president of Pittsburgh Coke & Chemical, Henry L. Hillman, H. R. Mustard, W. J. Haude, Dr. J. B. Skaptason, and Dr. W. B. Brown.

•

Cotton Branch Meeting

Dr. John T. Creighton, University of Florida, Gainesville, was elected chairman of the Cotton States Branch of the American Association of Economic Entomologists at the group's annual meeting at Atlanta, Ga., February 4, 5 and 6. Dr. Creighton succeeds Dr. Dwight Isely, University of Arkansas as chairman. Other officers named included J. W. Ingram, Bureau of Entomology & Plant Quarantine, Houma, Louisiana, vice-chairman; and K. P. Ewing, B.E.P.Q., Waco, Texas, secretary-treasurer.

Features of the meeting included the presentation of numerous papers covering control of cotton insects, a cotton insect symposium with Dr. R. W. Harned, B.E.P.Q. presiding; the annual address of the Cotton States Branch chairman, and a talk by S. A. Rohwer, president of the A.A.E.E.

The group will hold its 1949 meeting at a city on the Mississippi river, to be selected by the executive committee at a later date.

•

Meetings

North Central States Branch, A.A.E.E., Hotel Pere Marquette, Peoria, Ill., March 25 and 26.

Pest Control Operators Meeting, Purdue University, Lafayette, Indiana, April 5-9.

Western Chapter, National Shade Tree Conference, Santa Barbara, California, May 20-22.

Pacific Slope Branch, A.A.E.E., June 14-16, Vancouver, B. C.

National Fertilizer Association, Annual Summer Meeting, June 21, 22, 23, White Sulphur Springs, W. Va.

Eighth International Congress of Entomology, August 9-15, Stockholm, Sweden.

Amer. Ass'n. Economic Entomologists, New Yorker Hotel, New York, December 13-16, 1948.

Dinsmoor to Am. Potash

American Potash & Chemical Corp., has announced the appointment of Daniel S. Dinsmoor as Director of Development for the company. Mr. Dinsmoor, until recently a vice-president of Monsanto Chemical Co., will work in the Los Angeles office in conjunction with Samuel Cottrell, vice-president in charge of technical operations.

Mr. Dinsmoor holds degrees from Dartmouth and Harvard Universities, and has been indentified with chemical manufacturing for 30 years.

•

Farm Chemurgic Meeting

The National Farm Chemurgic Council was scheduled to hold its annual meeting at the Fontenelle hotel, Omaha, Nebraska March 3 to 6. The advance program called for talks by Val Peterson, governor of Nebraska, and Wheeler McMillen, president of the N.F.C. Council. A number of symposia were to be held.

Mutz Opens Law Office

Anton B. Mutz has announced his resignation from the Insecticide division of the U. S. Department of Agriculture, to enter private law

ANTON B. MUTZ

practice in Chicago. Mr. Mutz will specialize in matters pertaining to the Federal Insecticide, Fungicide and Rodenticide Act, and the Federal Food, Drug, and Cosmetic Act.

Mr. Mutz is a graduate of DePaul University Law School, Chicago, with the class of 1936. He practiced law in Illinois for five years, and became associated with the U.S.D.A. in 1941. He is a veteran of World War II, during which he served in the southwest Pacific area.

His law offices are at 111 West Monroe St., Chicago 3, Illinois.

N. W. Group Elects

The Northwest Vegetable Insect Conference, meeting at Portland, Oregon in its seventh annual meeting January 19 and 20, elected George F. Knowlton, Logan Utah, chairman of the Conference. Other officers named included W. C. Cook, U.S.D.A., Walla Walla, Washington, co-chairman; and David H. Brannon, State College of Washington, Extension Service, Pullman Washington, secretary-treasurer.

State and Federal entomologists engaged in research or extension work on insects affecting vegetables in Idaho, Montana, Oregon, Utah and Washington attended the meeting. No formal recommendations for the control of vegetable insects were issued.

Kephart to Advisory Staff

To the list of Editorial Advisory Board members on page 5 is being added this month, the name of Dr. L. W. Kephart, in charge of weed investigations, Division of Cereal Crops and Diseases, Bureau of Plant

DR. L. W. KEPHART

Industry, Soils, and Agricultural Engineering of the U. S. Department of Agriculture.

The increasing importance of chemicals in the agricultural weed control picture and the consequent interest of *Agricultural Chemicals* in covering this field accurately, called for the aid of an additional expert on the advisory staff. Dr. Kephart is the man.

He has been with the Bureau of Plant Industry of the U.S.D.A. for thirty-five years, and has been prominent in weed control from the start. In 1927 and 1928 he traveled in East Africa for the U.S.D.A., on a plant collecting trip.

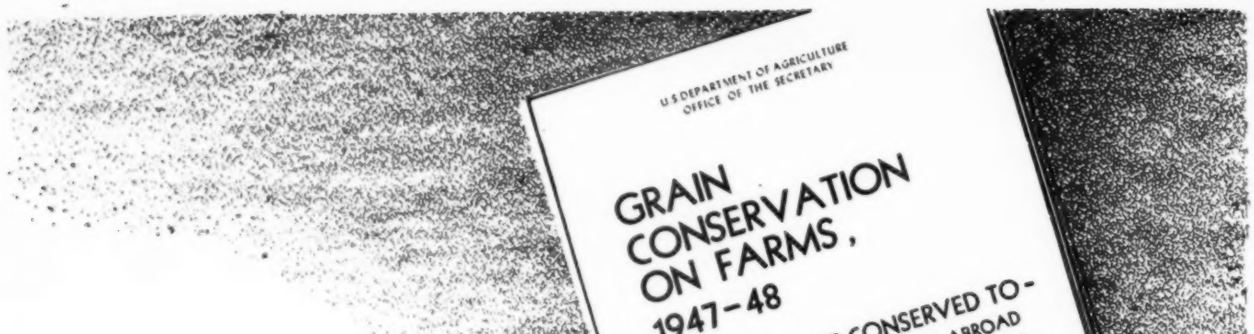
In 1935, a new section on weed control research was organized, and Dr. Kephart was placed in charge of the weed investigations of the Div. of Cereal Crops and Diseases, where he has remained since. It was under the direction of Dr. Kephart that some of the first tests of 2,4-D were made, and his section has been a leader in the use of that herbicide since 1944.

The addition of Dr. Kephart brings to seven the number now serving on the Advisory Board. The other six are: Dr. Alvin J. Cox, retired chief, Bureau of Chemistry, California State Dept. of Agriculture, Palo Alto, Calif.; Lea S. Hitchner, executive secretary of the A.I.F. Association New York; Dr. S. E. A. McCallan, Boyce-Thompson Institute of Plant Research, Yonkers, N. Y.; Dr. Charles E. Palm, head, Department of Entomology, Cornell University, Ithaca, N. Y.; S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, Washington; and Dr. Colin W. Whittaker, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture.

WESTERN SPRAY CONF.

(*Continued from Page 64*)

the first brood is not present. In 1947 some filbert orchards registered as high as thirty percent wormy nuts. The filbert worm pupates in the ground. Two applications of five percent DDT dust reduced the nut infestation from 16.1% to 0.8% wormy nuts.



HOW

YOU can help this government program

The Anti-Inflation Bill just passed by Congress directs the President, through the Department of Agriculture, to carry out a program for the conservation of food and feed.

You, as an insecticide manufacturer, can help this program by pushing your products and your know-how for the control and eradication of insects and rodents.

The Powell Company, as basic manufacturers of insecticide, rodenticide and weed control materials, can help you help this program. We offer you all the cooperation that our quarter century of experience is worth. Our technical staff will help you in selecting materials. Our sales staff will help you to promote them.

Among the Powco Brand products you should use and promote in this program are:

- Cattle grubs.....Cube Powder
- Rodent Control.....Antu
- Poultry lice, ticks, etc.....BHC (Benzene Hexachloride)
- General Insect Control: Animal parasites, stored grain insects, cattle insects, agricultural insects, nuisance insects, etc.
  - PYRIN #20
  - BHC
  - JP-25 (25% DDT emulsion)
  - JP-30 (30% DDT oil soluble)
  - JP-50 (50% DDT powder)
  - JP-50W (50% DDT wettable powder)
- Weed Control (cereals, corn, flax) 2,4-D

How the new government program can help YOU

The government has initiated a nationwide publicity program emphasizing the need to save grain and feed. Detailed literature, posters, recommendations and other forms of promotion are now in the hands of all State Extension Directors for their use. In addition, the full cooperation of trade associations and other interested groups has been enlisted. Here's a great opportunity for Insecticide Manufacturers like yourselves to develop this program. What's more, you'll profit by its success.

Make your plans today and let us know how we can help you.

John Powell & Co., Inc.

ONE PARK AVENUE NEW YORK 16, N. Y.

SALES OFFICES: CHICAGO - SAN FRANCISCO - PITTSBURGH - PHILADELPHIA - ST. LOUIS
CANADA: CHARLES ALBERT SMITH, LTD., TORONTO - MONTREAL
In Argentina—John Powell Y CIA, Condarco 1535, Buenos Aires, Argentina, Telephone 59, Paternal 0021.
POWCO BRAND PRODUCTS: Antu - Pyrin R - Pyrin D-20 - JP No. 10 - JP No. 25 - JP No. 30 - JP No. 50 - JP No. 50W - Pyrethrum Powders and Extracts - Stimtox "A" - Rotenone Powders - Sabadilla - Aerosol Formulas - 2,4-D - BHC (Benzene Hexachloride) - HETP (Hexaethyl Tetraphosphate).

The afternoon of Jan. 22nd was devoted to committee meetings.

The morning session of January 23rd was absorbed by committee reports. The nominating committee's choice of E. J. Newcomer, Yakima, Washington, to continue as chairman, and F. L. Overley, Wenatchee, Washington, to remain as secretary, was adopted and the two were re-elected unanimously. It was voted that the next meeting be held in the same place on January 26, 27 and 28, 1949.

The afternoon was given over to the open meeting. The "Suggestions" for the use of sprays for orchard insects, mites and plant diseases in 1948, carefully scrutinized, amended and approved when presented by the committee at the morning session, was read and discussed. There were short talks by G. F. Knowlton, A. D. Borden, Leroy Childs, W. J. O'Neill and Kenneth Walker. Robert Murray of British Columbia spoke of difficulties with equipment. He stated that there is some good in all kinds of equipment. The fog machine was condemned too soon, as it may be usable with certain modifications. In British Columbia they are designing and building their own spraying and dusting equipment. More concentrated materials are being considered, but with too much concentration the coverage suffers and control is lowered. Their engineers are working out final details, and they hope to have a successful 100 gallon spraying machine, with an empty weight of 1,600 pounds.

Chairman E. J. Newcomer turned the meeting over to Ed Littooy who presided over the industry program. He introduced Dr. J. L. St. John, President, Economic Poisons Control Officials Association, who described this organization and spoke of some of its aims and objectives.

Leo R. Gardner spoke on the subject, "Benzene Hexachloride, an Insecticide of Merit." He reviewed the history of the chemical, and brought it up to recent times when its developments have been in refinement, purity and reduced odor, the most notable result being the commercial pure gamma isomer of benzene hexachloride which is relatively odor free. The gamma content is a correct measure of the insecticidal value. The mode of action of benzene hexachloride is of interest in that the material functions as a stomach poison, a contact poison and as a fumigant. It is also stable to heat and may be applied as a smoke.

The material has proved especially valuable for control of mange and lice on domestic animals, houseflies, grasshoppers, plum curculio on peaches, cotton pests, wireworm, white grub and many other soil insects, aphids on vegetable and seed crops, lygus bugs and thrips.

A. Kirkpatrick spoke on "Thiophos 3422," parathion—A new pesticide. It is an ester of thiophosphoric acid. Because of its toxicity, it should be handled and used with care and not used indiscrimtnately on food crops until more data are available. Atropin sulfate may be an antidote to offset poisonous effect. He

stated that some parathion may be available in March or April, but control programs should be carried on as in the past. Apply materials as usual and don't expect to perform miracles with parathion late in season.

SHADE TREE CONFERENCE

(*Continued from Page 41*)

logist, Lebanon, Ill., declared that although an industrial plant may be discharging "hundreds of tons of sulfur dioxide in the air daily, not much of it reaches vegetation in the surrounding area." The fumes, he explained, pass up through lofty smoke stacks at high temperatures, and are dispersed in the upper air.

DDT can help in controlling the spread of Dutch elm disease, it was brought out by Paul E. Tilford, executive secretary of the National Arborists Association, Wooster, O. The fungus causing the disease is carried by the elm bark beetle and by using the insecticide to prevent emergence of the beetle the cycle leading to the trouble can be broken, he declared. Sprays should also be used, he advised, to control canker worms which defoliate and thus devitalize the afflicted elm tree.

If 2,4-D weed killer were used in all the weed infested grain fields of this country the increased yield alone, declared J. E. McDonell of the Sherwin-Williams Co., Milwaukee, Wis., would be sufficient to feed the starving peoples of Europe. "Agriculture's New Conquest," a colored motion picture with sound, shown by Mr. McDonell, presented a dramatic story of results during 1947.

The national organization's meeting will be held at the Schrader Hotel, Milwaukee, Wis., Aug. 23 to 27, 1948.

WESTERN WEED CONF.

(*Continued from Page 58*)

and the necessity for untreated plots. The plots will give the information, but the farmer always wants to treat the whole field. Replicas measure the difference between treatments. The average of 30% and 80% is 55%, but this result is not as good as results centering around 55%. Readings with regard to perennials must be deferred until the following season. Different conditions give significant differences. Problems should be set up so that the significant factors can be picked out and analyzed.

Francis E. Hance, Hawaiian Sugar Planters Experiment Station, Honolulu, Hawaii, spoke on Hawaiian conditions where there are weeds continuously, without any season. He described the harmful effects of 2,4-D on sugar cane. Soil type and dosage probably determine whether or not injury occurs. J. van Overbeek, Shell Agricultural Laboratory, Modesto, California, discussed fundamental research.

Committees reporting included those on Education, Policy, Resolutions, Legislation, and the Executive Committee. The 1949 meeting will be held in Bozeman, Montana, at about the same time of year. ★★

AIFA MEETING

(*Continued from Page 37*)

Radio Forum

FARM radio programs may do a good educational job for chemical pest control, according to the five farm radio editors who appeared on the forum Friday morning. Moderator was Don Lerch, Director of Agriculture for the Columbia Broadcasting System, who introduced the others: Phil Alampi, farm director, WJZ, New York; Homer Martz, farm director, KDKA, Pittsburgh; Ken Gapen, chief of radio and video, U.S.D.A.; and Tom Page, farm director, WNBC, New York. To sum up the brief talks by each, it was stated that the big job is to sell ideas to the listening farm people, to acquaint them with new methods of carrying on their work, and with newly-developed chemical means of pest control. In the U. S. there are some 340 farm program people in radio station, and these persons spend from 10 percent to all their time in this type of work. They cooperate with groups . . . through field specialists, land grant colleges, and county agents in particular. Many of the latter have radio time of their own, in which they reach practically every farm home in their areas, and are able to speed up the distributing of information.

That radio farm editors want material was expressed by Tom Page, who told somewhat about the type of information needed, and how it should be presented. He emphasized that a correspondent should tell all about the product in question, and in addition, let the radio station know where more information may be obtained about the product. He reminded that everything sent in may not get on the air, but that all manuscripts are looked over carefully for useable material.

A question and answer session followed, with the crowd inquiring more about radio work, and its ramifications in the chemical field.

Following the luncheon on Friday, a membership session discussed some of the problems confronting industry in 1948, and its relationship to the conservation program. Wallace S. Moreland, Rutgers University, was discussion leader, with a panel consisting of Russell B. Stoddard, U. S. Industrial Chemicals, Inc.; Ernest Hart; and P. J. McManus, Cooperative GLF Soil Building Service, Inc.

Committee reports were read as follows: Membership and Information Committee, Mr. Stoddard; Technical Committee, Dr. L. Gordon Utter, Philps Dodge Refining Corp.; Legislative Committee, W. W. Sunderland; Committee on Application Equipment, Jack Vernon; and Traffic Commitee, E. C. McClintic.

Registration of AIFA members was close to 200 in addition to a number of interested visitors who attended the open sessions. There was no election of officers at this meeting.

LISTENING POST

(*Continued from Page 60*)

and others to prevent insect losses to food and feedcrops. Columbia's

"Country Journal program included a story on this general subject on February 21, and plans are under way to cover various angles of the problem on other farm programs within the next few weeks.

The importance of visual material as an aid to encouraging better utilization of insect control methods is not being overlooked. A three-reel, 16mm. motion picture, in sound and color, on the European corn borer and its control is in process of preparation. This is expected to be ready for release sometime this spring. A large exhibit on the corn borer and its control is being prepared by the Exhibit Service of the U. S. Department of Agriculture, in cooperation with the Bureau of Entomology and Plant Quarantine, for use on the State Fair circuit. If facilities permit, it is planned to have duplicates made for use earlier in the season at county fairs, large agricultural meetings, and similar gatherings throughout the area in which the corn borer occurs. In cooperation with the Extension Service, two slide films are being prepared for the use of county agents and others who conduct local meetings. One of these will deal with the European corn borer and its control. The other will be on the subject of the Japanese beetle, particularly as a pest of corn, and methods for preventing its damage to that food crop. Other visual materials either in process of preparation or planned include display panels and posters of the "call to action" type.

Timeliness is of special importance if these various informational materials are to accomplish fully the purpose for which they are intended. Accordingly, work is being pushed ahead as rapidly as facilities permit on the preparation and issuance of these items.

The informational program under way calls for a concerted effort to present those lines of attack which it is believed will be of the most practical assistance in encouraging and aiding farmers and others concerned to help conserve and produce more food and feed by controling insect pests. Excellent cooperation in the attainment of the desired objective is being rendered by many agencies, both within and outside the Department of Agriculture.★★

NITROGEN SUPPLY

(*Continued from Page 27*)

nearly four times the prewar consumption of nitrogen. The greatest increase was in Asia which has a very dense population and had a comparatively small prewar use. The North American target was about three times the prewar use or about 50 percent above the present use; and in Europe the target was slightly less than twice the prewar use, most of which has already been attained in countries such as the United Kingdom and Norway.

The Committee of European Economic Cooperation in its report emphasized that fertilizer was vital to restoration of soil fertility and was required to implement the agricultural

production program. The use of commercial fertilizers was expanding steadily before the war in the countries participating in the report, but was checked during the war in many of the countries by supply difficulties. A further increase in the utilization of fertilizers including nitrogen is planned to achieve the food goals. In the sixteen countries by 1950-51 the use of nitrogen is expected to be nearly 2 million tons, or about twice the average consumption in 1934-38. Production of nitrogen will be increased so that these countries will be self sufficient by 1950-51.

The studies made by the U. S. Department of Agriculture in cooperation with the Production and Marketing Administration State Committees and with the assistance of agronomists of the land grant colleges indicate that the present level of nitrogen consumption could be increased by 50 percent or more. Even so, the consumption in the United States on most land suitable for fertilization would still be low on an average compared with the rates of application per acre before the war in Western Europe and Japan.

All of these studies indicate that nitrogen needs of the future are greater than the present rate of consumption. Many economic, social and other factors will play an important part in determining the progress that will be made in hitting these targets — targets that are based not only on nitrogen needs for increasing crop yields and more efficient production, but on the food needs of an increasing world population.★★

GUEST EDITORIAL

(*Continued from Page 23*)

the decade of the 30's other chemicals such as borax, ammonium sulfamate, ammonium thiocyanate, the dinitros, and many others, came along to continue that interest. Most of these treatments, however, constituted nothing more than last-minute surgery. Despite occasional treatments in crops, like the dinitros on grain and the oils on carrots, the basic weed control methods remained what they had been—hard work by hand.

The announcement of 2,4-D and other organic herbicides in 1944 gave weed control an entirely different picture. Now, almost for the first time, like the entomologist and the plant pathologist, the weed control specialist can write prescriptions which can be used in the ordinary course of growing crops. Also, like the entomologist and plant pathologist, he finds that preparations which are effective on one weed are ineffective on another, so he requires a whole armory of suitable chemicals.

The organic chemist is rapidly supplying this armory of chemicals. The bottle-neck in the situation is that there are not enough men to test them and determine their safe and effective uses. The few old-timers in weed control are completely occupied with answering questions, carrying on correspondence, and conducting needed research which ten times their numbers could hardly accomplish.

In view of the tremendous impor-

tance of weeds to the farmers of the nation, the demand for men to conduct research and extension in weed control, is bound to continue and expand, both in public employment and in industry. Weed control will measure up to the stature of its related control activities.

There is no better field than that of weed control for the young man choosing a profession. It is new, fascinating, important, and well paid, with rapid advances for any one of ability. At present, because of its newness, men choosing fields of graduate study tend to choose the more widely known specialties. Research assistantships which lead rapidly to better positions are now vacant. This condition is temporary, but it offers an outstanding opportunity to young men to start in an uncrowded profession.★★

2,4-D AND PLANTS

(*Continued from Page* 30)

which would bring about a similar effect should be tried together with 2,4-D treatment.

It is known that the rate of inactivation of 2,4-D in soil is affected by several factors including moisture, temperature and the presence of soil organisms and organic matter. As more basic information is gained about how 2,4-D and other herbicides kill plants, we will be better able to make more efficient use of these chemicals as a means of weed control.★★

Literature Cited

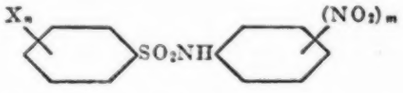
1. Brown, James W., Effect of 2,4-dichlorophenoxyacetic acid on the water relations, the accumulation and distribution of solid matter and the respiration of bean plants. Bot. Gaz. 107: 332-343. March, 1946.
2. ————, and Mitchell, John W., Inactivation of 2,4-D in soil as affected by soil moisture, temperature, the addition of manure and autoclaving. Bot. Gaz. (In press).
3. Hamner, C. L., and Tukey, H. B., Herbicidal action of midsummer and fall applications of 2,4-D. Bot. Gaz. 106: 232-245. 1944.
4. Lucas, E. H., and Hamner, C. L., Inactivation of 2,4-dichlorophenoxy acetic acid by adsorption on charcoal. Sci. 105: 340. 1947.
5. Marth, P. C., and Mitchell, J. W., 2,4-Dichlorophenoxyacetic acid as a differential herbicide. Bot. Gaz. 106: 224-232. December, 1944.
6. Martin, J. P., The hormone weed-killer, Calif. Citrograph 31(7): 248, 264-5. 1946.
7. Mitchell, J. W., Unpublished data.
8. ————, and Marth, P. C., Germination of seeds in soil containing 2,4-dichlorophenoxyacetic acid. Bot. Gaz. 107: 408-416. Mar. 1946.
9. ————, and Brown, J. W., Effect of 2,4-D on the readily available carbohydrate constituents in annual morning glory. Bot. Gaz. 107: 120-129. Sept. 1945.
10. ————, and ————, Movement of 2,4-D stimulus and its relation to the translocation of organic food materials in plants. Bot. Gaz. 107: 393-407. Mar. 1946.
11. Rasmussen, Lowell, The physiological action of 2,4-D on dandelion, Taraxacum officinale. Plt. Physiol. 22: 377: 392. Oct. 1947.
12. Stevenson, E. C., and Mitchell, J. W., Bacteriostatic and bactericidal properties of 2,4-D. Sci. 101: 642-644. June 1945.
13. Zimmerman, P. W., and Hitchcock, A. E., Substituted phenoxy and benzoic acid growth substances and the relation of structure to physiological activity. Boyce Thompson Inst. 12: 321-344. 1942.

Industry Patents

The following patents have recently been issued by the U.S. Patent Office on products and devices in the agricultural chemical field. Copies of the patents may be obtained at 25c each by addressing the U.S. Patent Office, Washington 25, D.C.

2,435,204. HERBICIDES. Patent issued Feb. 3, 1948, to John H. Davidson, U. S. Navy, South Haven, Mich., assignor to the Dow Chemical Co., Midland, Mich. A method for kiling trees and shrubs which includes applying to the base of the plant at soil level an herbicide composition comprising as the principal effective ingredient ethylene bromide.

2,435,274. CONTROL OF INSECTS. Patent issued to W. F. Hester, Drexel Hill, Pa., assignor to Rohm & Haas Co., Philadelphia. The process of controlling insects which comprises supplying the environment of said insects with a compound of the formula:



wherein X is a halogen, *n* is an integer from one to five, inclusive, and *m* is an integer from one to three, inclusive.

2,435,458. CATIONIC ISOQUINOLINE PESTICIDE. Patent issued February 3, to Hugh H. Mosher, Teaneck, N. J., and Frank L. Howard, Kingston, R. I., assignors to Onyx Oil & Chemical Co. In the treatment of higher plants to protect them against the action of pests and fungi, etc., the improvement which comprises applying to organs of the plants a cationic isoquinolinium compound having attached to its nitrogen an acid radical and a straight chain hydrocarbon radical containing 8 to 18 carbon atoms.

2,435,499. PARASITICIDAL PREPARATIONS. Patent issued Feb. 3, 1948, to Elbert C. Ladd, Passaic, N. J., assignor to U. S. Rubber Co., New York. A fungicidal composition comprising an aqueous suspension of 2, 3-dichloro-2, 3-dihydro-1, 4-naphthalenedione containing a dispersing agent. The improvements in propagating plants from cuttings and the like which comprises subjecting the cuttings to the action of 2, 3-dichloro-2, 3-dihydro-1, 4-naphthalenedione.

2,435,501. ACENAPHTHENEDIONE AS PARASITICIDAL PREPARATIONS. Patent issued Feb. 3, 1948, to Elbert C. Ladd, Passaic, N. J., assignor to U. S. Rubber Co., New York. A fungicidal preparation comprising acenaphthenedione as an active ingredient in an aqueous suspension containing a dispersing agent.

2,435,676. HERBICIDE. Patent issued Feb. 10, 1948, to C. D. Fitzgerald and G. E. Lynn, Midland, Mich., assignors to Dow Chemical Co., Midland. An herbicidal composition comprising a water soluble pentachlorophenolate as the principal phytotoxic ingredient and, as an activator therefor, a water-soluble salt of a strong acid and a weak base.

2,435,690. INSECTICIDE. Patent issued Feb. 10, 1948, to Henry L. Morrill, Clayton, Mo., and Carl J. Weinman, Champaign, Ill., assignors to Monsanto Chemical Co., St. Louis, Mo. An insecticidal composition comprising 5 to 10 percent ortho-nitro-diphenyl, 20-50 mg. of pyrethrins per 100 cc. of composition, a deodorized petroleum oil spray base having a viscosity in the range of 60-100° F., and an amount of substance selected from the group consisting of ortho-phenyl-cyclohexanol and ortho-cyclonitrodiphenyl in solution in the oil base.

2,435,780. ALKYL ESTERS OF ALPHA-CYANO BETA FURYLIENE ACETIC ACID AS INSECT REPELLENTS. Patent issued Feb. 10, 1948, to Ralph E. Heal, New Brunswick, N. J., assignor to Merck & Co., Inc., Rahway, N. J. An insect repellent comprising a solution of alpha-cyano, beta furyliene-acetic acid ethyl ester in a di-lower alkyl phthalate.

Trade Mark Applications

ANTARA 424, in capital letters, for chemical composition used as a dispersing agent, a wetting agent, or a solvent for organic chemicals. Filed Aug. 24, 1946, by General Aniline & Film Corp., New York. Claims use since July 18, 1946.

POWCO, in lower case letters superimposed over oval shield. For insecticides, fungicides, germicides, pesticides, and disinfectants for the control of bacteria in infestations of utensils. Filed May 26, 1947, by John Powell & Co., Inc., New York. Claims use since Oct. 4, 1946.

RAD, in capital letters, for rat poison. Filed Oct. 16, 1946, by Eugene C. Bielefeld, doing business as Bielefeld Products Co., New Knoxville, Ohio. Claims use since Oct. 5, 1946.

•

Pea Weevil Control

U.S.D.A. Bulletin E-740 reports the tentative results of field experiments with DDT for the control of the pea weevil. The work was carried on by Ralph Schopp, Frank G. Hinman and T. A. Brindley, of the Division of Truck Crop and Garden Insect Investigations, in cooperation with the Agricultural Experiment stations of Idaho and Washington. The preliminary report states that DDT is an effective control for the pea weevil. Five percent DDT dust was nearly as effective when applied at 10 pounds per acre as at 20 and 40 pounds per acre, but in the weaker concentration was slightly slower acting.

Applied at a uniform rate of 20 pounds per acre, a dust containing 2.5 percent of DDT was superior to a dust containing 1.25 percent and as good as one containing 5 percent. Both DDT and rotenone dusts had lost much of their insecticidal effect after 4 days. It was also noted that weevil populations were always lower on the second day after dusting with DDT than on the first day.

•

Potomac Div. APS Meets

The fifth annual meeting of the Potomac Division of the American Phytopathological Society was held February 11 and 12 at the U.S.D.A. Plant Industry Station, Beltsville, Md. The meeting program included the reading of a number of papers on plant disease control, and discussion of fungicidal products, including organics, the dithiocarbamates, soil treatments, and reports of plant disease studies.

The group elected officers as follows: W. F. Jeffers, president, to succeed V. F. Tapke; C. L. Lefebvre, vice-president; J. B. Demaree, secretary-treasurer; and Paul R. Miller, Councilor. The new president held the office of vice-president last year. W.W. Diehl was secretary-treasurer, and E. E. Clayton was councilor during 1947.

•

New Chicago Rep.

Pennsylvania Salt Manufacturing Co., Philadelphia, has announced the appointment of Hugh R. Bishop as sales representative in the Chicago territory for the company's heavy chemicals division. Mr. Bishop is a graduate of Lehigh University, and joined Pennsalt in 1939. He was in the Army Air Corps during the war years, and emerged from the service in 1946 with the rank of lieutenant-colonel.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 1st of month.

Positions Open

Field Entomologist: A well-established and nationally known manufacturer of agricultural chemicals requires the services of an entomologist for field work in the Pacific Northwest with headquarters in Washington or Oregon. The duties of the post include the running, observing, checking and reporting of field tests (throughout the territory assigned) with products developed in our research program, and consultation with the trade and state and Government stations. Materials handled include insecticides, fungicides, herbicides, etc. Please include all pertinent personal and professional information and photograph in your reply. Address Box 228 care of Agricultural Chemicals.

Wanted — Experienced salesman in midwest, also one on west coast, to represent basic producer of insecticide raw materials and agricultural chemicals. Send full details to box No. 229, care of Agricultural Chemicals.

Plant Physiologist or Pathologist: A major producer of Agricultural chemicals in the Middle Atlantic area requires the services of a plant pathologist or plant physiologist with experience in the field of fungicides to conduct laboratory and field evaluation tests of new chemicals as fungicides and herbicides. Permanent position in a well-organized and growing department. In replying, please submit all pertinent professional and personal information. Address reply to: Pennsylvania Salt Manufacturing Company, Director, Whitemarsh Research Laboratories, Box 4388, Chestnut Hill P.O., Philadelphia 18, Pa.

Wanted — Chemical engineer and plant superintendent experienced in manufacturing agricultural insecticide chemical raw materials. Address Box No. 230, care of Agricultural Chemicals.

Insecticide Sales: Experienced man with at least ten years in insecticide sales or sales management wanted by leading manufacturer in the field. Should know the industry and be known. Excellent opportunity. Send full details experience, salary, etc., to Box 231 care of Agricultural Chemicals.

Technical Sales: Young man with education and background in entomology or chemistry wanted by old established producer of agricultural chemical products. Location southeastern section U. S. Give facts on education, experience, salary in letter. Address Box 233, care of Agricultural Chemicals.

Positions Wanted

Insecticide Act: Lawyer past five years experience large manufacturer in Food, Drug & Cosmetic Act, Insecticide Act, labels, contracts, etc., will act as house counsel for firm in these fields. For further details, communicate Box 232 care of Agricultural Chemicals.

Miscellaneous

Exporter specializing in the agricultural field is interested in representing manufacturers of insecticides, fertilizers, etc. Address Box 223 care of Agricultural Chemicals.

Wanted: Company manufacturing well-known brand of agricultrral insecticides (several exclusive) desires distributors in good territories. Must be able to bill own accounts. Address

Box 235 care of Agricultural Chemicals.

Wanted to Buy: Manufacturer will purchase going business producing chemical or other specialties for the agricultural, drug, household products, or allied fields. Old established firm interested expanding into specialty field. Give details in confidence either direct or through attorney. Full exchange references. Address Box 234 care of Agricultural Chemicals.

•

AAEE Meeting Date Set

The 1948 Annual meeting of the American Association of Economic Entomologists will be held at the New Yorker Hotel, in New York, on December 13, 14, 15 and 16, it was announced recently by S. A. Rohwer, A.A.E.E. president. In charge of local arrangements is Dr. Charles L. Smith, technical director of the Agricultural Insecticide and Fungicide Association, New York.

•

M.I.F.I. Names Officers

Some 75 dealers, distributors and manufacturers of insecticides attended the meeting of the Michigan Insecticide Fungicide Institute at Michigan State College, E. Lansing, on January 16 and 17. The group elected the following officers: E. W. Jamieson, Dearborn, Mich., president; Kenneth B. Garlinger, Cadillac, Mich., treasurer; and Wayne A. LeCureux, Lansing, Mich., secretary.

The program included discussions of new insecticides, reports of field tests, and information on the use of fungicides for control of plant disease.

•

Rat Campaign Launched

Designed to supplement the Rural Rat Control Campaign currently being conducted, the National Urban Rat Control Campaign, scheduled to be carried on from March through April of this year, got underway with a spirited discussion of rat control application problems of industrial and institutional properties, at the Hotel Biltmore, New York, Feb. 18.

Present at the meeting, were Hamilton M. Warren, vice president of National Carbon Co., New York, and chairman of the National Committee on Rat Control, as well as representatives of the Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C.

In mentioning that the campaign is a part of the President's Emergency Food Conservation Program, Mr. Warren stressed the fact that total rat damage in the U. S. is now estimated at 2 billion dollars annually, half of which amount is accounted for by rat contamination and destruction of foodstuffs. Every year rats destroy more than 200 million bushels of grain, almost half the amount the U. S. plans to send to Europe during 1948, Mr. Warren said.

•

P.C.O. Meet at Purdue

The twelfth annual Pest Control Operators Conference is scheduled to be held at Purdue University, Lafayette, Indiana, on April 5 to 9, it has been announced.

•

Int'l Minerals New Mine

A new phosphate mine and plant near Bartow, Fla. being constructed by International Minerals and Chemical Corp., was expected to go into operation early this month.

It will eventually reach an output of 1,500,000 tons of phosphate annually, the largest operation of its kind in the western hemisphere.

•

Advance Muriate Price

American Potash & Chemical Corp., has announced an increase in the price of muriate of potash from 45.5c to 48.5c per unit K_2O in bulk, f. o. b. cars at Trona, California. The advance, first in seven years, was made necessary by rising labor costs.

•

Machen Joins Lion Oil

Bernard M. Machen, Montgomery, Alabama, has joined the sales staff of Lion Oil Co., Chemical Division, and will represent the firm in Alabama and parts of Tennessee, Mississippi, Georgia, and Florida. Mr. Machen was formerly a sales representative of the Barrett Division of Allied Chemical and Dye Corp., specializing in the sale of nitrate fertilizer.

Advertiser's Index

(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)

TALE ENDS

WAS our face red! After our heralding the presence of Secretary of Agriculture Clinton P. Anderson at the AIFA meeting, by a front cover photo and through other means, Mr. Anderson was forced to cancel his talk because of other pressing duties. His substitute, Dr. Charles F. Brannan, turned in a very creditable performance, however. . . . The sound movies shown at the Thursday night session had some severe competition since President Truman was also at the Statler speaking at a dinner, and was scheduled to walk down the corrider near the AIFA gathering room. Quite a number of conventioneers were seen to leave the movie in favor of watching the President. . . . Speaking of presidents, AIF president George F. ("Grub") Leonard was unable to be present because of a severe cold contracted from riding in a frigid train a few days before the meeting. His substitute, Ernest Hart, did a fine job.

•

AN ancient "weed control" law on the statute books of New Jersey was mentioned by W. H. Allen, secretary of agriculture of that state, in his talk before the Northeastern Weed Control Conference in New York last month. The law says that if a farmer's place is visited by a neighbor, and the visitor discovers Canadian Thistle growing there, the visitor may count the thistles one by one, and sue the man on whose ground they are growing, 25c per thistle!

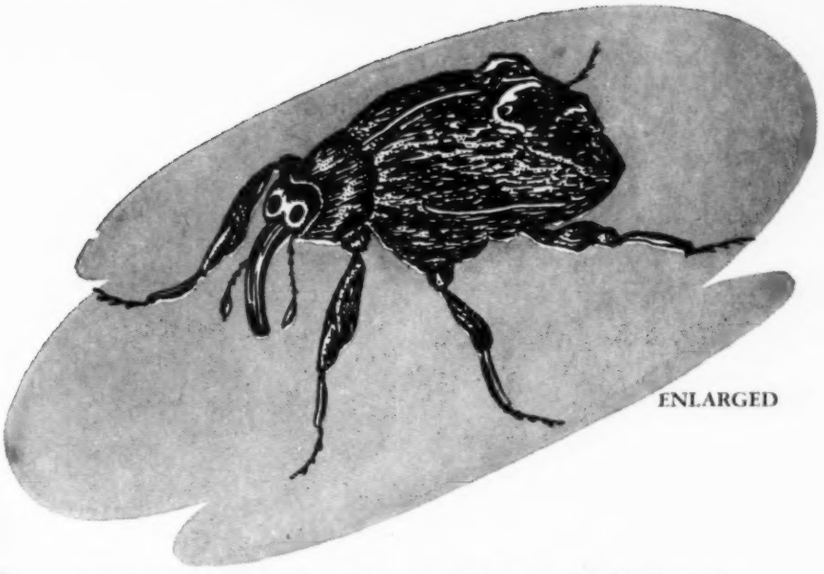
•

Just popped three buttons off our vest! Wrote the agricultural engineer for large nationally-known corporation: "You people should have lots of justifiable pride in your book. (Meaning *Agricultural Chemicals.*) It is certainly in a class by itself as to attractiveness, quality, editorial value, readability and practical usefulness." Also, we can feel our head swelling slightly! Nevertheless, we are deeply grateful for this very favorable expression of opinion about us.

PRINTED BY WATKINS PRINTING CO., BALTIMORE

PLUM
CURCULIO

(*conotrachelus nenuphar Herbst*)



ENLARGED

BUG OF THE MONTH

. . . controlled with Benzene Hexachloride

THIS ubiquitous snout beetle attacks plums, pears, peaches, cherries, apricots, prunes, nectarines, quinces, and other cultivated and wild fruits. Although its primary food is stone fruits, it is also extremely fond of the apple, and becomes second to the coddling moth in point of damage.

Injury results in swollen, knotty and early-dropping apples; wormy and rotten cherries; punctured and rotten peaches and plums. The plum curculio is one of the main agencies in spreading brown rot, and its eradication is intimately connected with reduction of brown rot damage.

Orthodox methods of control have not proved successful, perhaps because the eggs are laid and grubs develop in the fleshy part of the fruit, so that the skin protects them until damage is done. With the advent of Benzene Hexachloride, however, effective control of this insect may become a reality.

BHC is one of the most potent insecticides ever tested, yet appears one of the safest. It evaporates slowly, but completely, leaving no residue at harvest time. Acting as a fumigant as well as a stomach and contact poison, it makes possible dusts and sprays which will search out and kill the curculio wherever it may lurk.

Prentox Benzene Hexachloride Concentrate is available now, in quantity, as a dry free-flowing powder or wettable powder. It contains the highest practical percentage of the active gamma isomer. Particle size is carefully adjusted to develop optimum vapor pressure. Place your order now to assure earliest possible shipment.

R. J. PRENTISS & CO., Inc.

110 WILLIAM STREET, NEW YORK 7, N. Y.

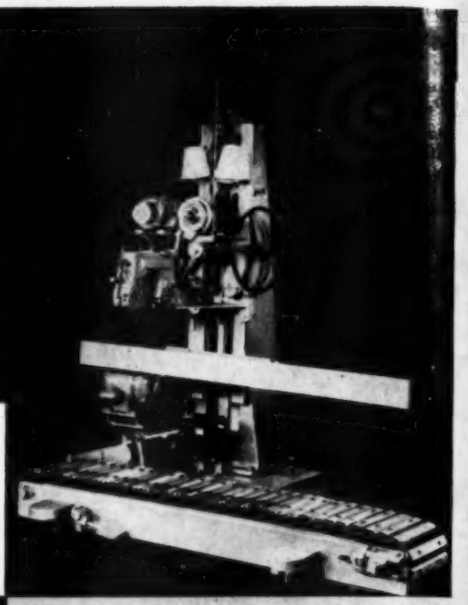
BOX 1407, RICHMOND, CALIF. 9 SO. CLINTON STREET, CHICAGO 6, ILL.

PRENTOX PEST-TESTED CONCENTRATES SOLD TO INSECTICIDE MANUFACTURERS ONLY

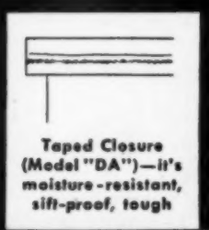
CLOSES MULTIWALLS

AT HIGH SPEEDS!

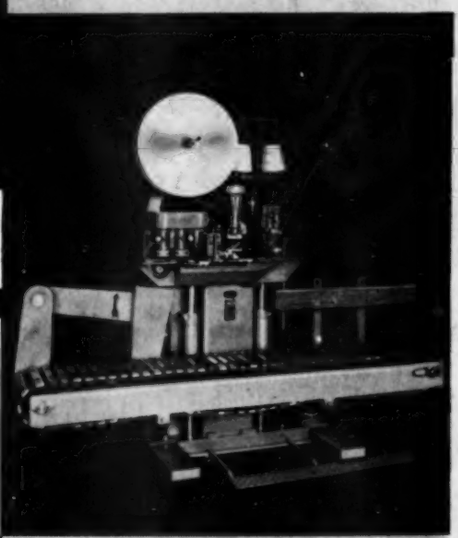
The famous BAGPAK® "cushion stitch"



MODEL "E 1" (portable)—closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.



Taped Closure (Model "DA")—it's moisture-resistant, sift-proof, tough



MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute . . . 6 to 12 where filled bags are delivered to BAGPAKER conveyor. Sewing operation starts and stops automatically—no tape wasted.

BAGPAK
DIVISION